Dash Responder

Version V 1.0

Servicing Instructions

2004768-001 ENG Revision F

CE
0459

GE Medical Systems
Information Technologies

Caution:

During repairs/service interventions, observe the protective measures against damage due to ESD.

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- This manual contains service information, operating instructions are provided in the Operator's Manual of the instrument.
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REFERENCES

Reference	Document Title
[UM]	User Manual for Dash Responder Version 1.0 Rev. A (2002853-002-A)
[Lang]	Languages of Dash Responder Version 1

Revision History

This manual is subject to the ***GE Medical Systems*** *Information Technologies* change order service. The revision code, a letter that follows the document part number, changes with every update of the manual. The initial version of the manual has the letter A.

Part No.	Revision Code	Date	Comment
2004768-001	V 0.1	2001-03	Draft
2004768-001	Rev. A	2001-05	Release A
2004768-001	Rev. B	2001-07	ECO 067557
2004768-001	Rev C	2001-09	ECO 067925
2004768-001	Rev D	2002-12	ECO 070336
2004768-001	Rev E	2004-01	ECO 075782
2004768-001	Rev F	2005-05	ECO 080823

1 General Introduction

The Dash Responder is a lightweight, portable defibrillator which must be connected to a Dash 2000 or Dash 3000/4000 patient monitor for operation.

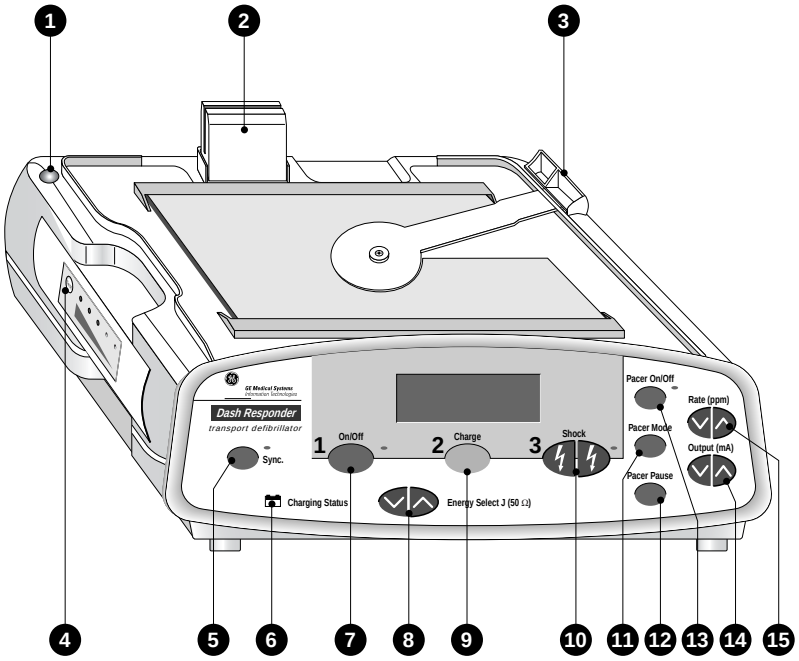
The Dash Responder is available with or without transcutaneous pacer.

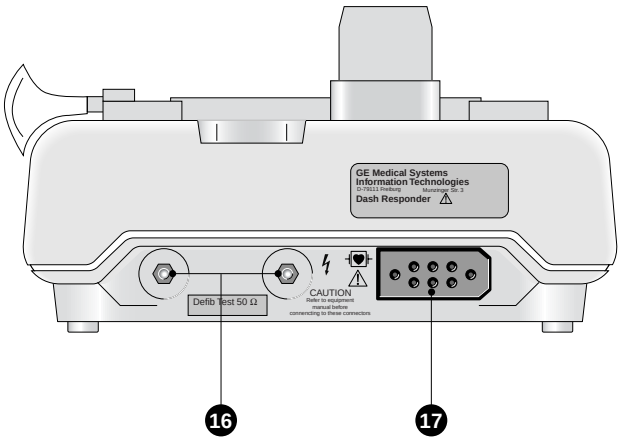
The Dash Responder is powered from a rechargeable battery which is inserted into the device. A new fully charged battery provides power for approx. 60 shocks with 360 J each or for approx. 5 hours of pacemaker operation at an average pulse rate and pacer output (75 ppm, 100 mA).

The Dash Responder will not operate unless equipped with the battery.

The battery charges automatically when the system (patient monitor and Dash Responder) is connected to the power line and both devices are not turned on. When the devices are on, the battery will charge only when the Dash Responder does not require the full energy for operation the patient monitor is able to deliver.

The Dash 3000/4000 also charges the defibrillator battery when disconnected from power line. A separate, optional charging unit (ASU 3000) is available for battery charging.





1 Button to unlock battery for removal

2 Monitor connector

3 Locking lever

4 Battery with "Test" button and charge level indication

5 **Sync.** button with indicator to enable and disable the synchronized operating mode (when the synchronized mode is enabled, the indicator is illuminated and goes off with each sync pulse)

6 Charging Status indicator
solid yellow: battery charging
solid green: battery charged
blinking yellow: charging error (replace battery)
flashing green: battery conditioning program active

7 **On/Off** button to turn the defibrillator on and off (indicator is illuminated when the device is turned on)

8 **Energy Select** buttons to select the defibrillation energy

9 **Charge** button to initiate defibrillator charging

10 **Shock** buttons to release the shock when adhesive or internal electrodes are connected (both buttons must be pressed simultaneously);
the indicator lights up when the defibrillator is charged

11 **Pacer Mode** button to select the pacer operating mode (fixed rate, demand)

12 **Pacer Pause** button to suspend delivery of pacer pulses (without changing the pacer settings)

13 **Pacer On/Off** button with indicator to turn the pacemaker on and off (when the pacemaker is enabled, the indicator is illuminated and goes off with each delivered pacer pulse)

14 **Output (mA)** button to change the pacer output current

15 **Rate (ppm)** button to change the pacer rate

16 Contacts for test discharge (possible only with adapter lead for adhesive defibrillation pads)

17 Connector for exchange of the defibrillation electrodes (switch off the device before exchanging the electrodes!)

2 General Overview of the Dash Responder

GE Medical Systems Instrument Part Numbers

Configuration of Instrument Part Numbers

The instrument part number comprises of ten digits, the first seven digits determine the instrument type and the last three—separated by a hyphen—the instrument version.

The user language is determined by configuration, thus is no part of the instrument number.

Configuration of the PCB Part Numbers

The number of the PCB is listed on the barcode label. The label can be seen on the PCB without dismounting.

As some PCBs need additional tests before they get delivered as field replacement boards, this boards and assemblies were given separate spare part numbers.

Therefore were special field replacement spare parts are available this need to be ordered (see Spare Parts List on page 64).

The affiliated documentation, e.g. reference diagrams, circuit diagrams and parts lists are listed under the part number of the PCB part number.

Instrument status documentation

Due to hardware and software combination, unambiguous documentation of the instrument assembly status is necessary also in event of repairs.

Master Record Index

2002550-013

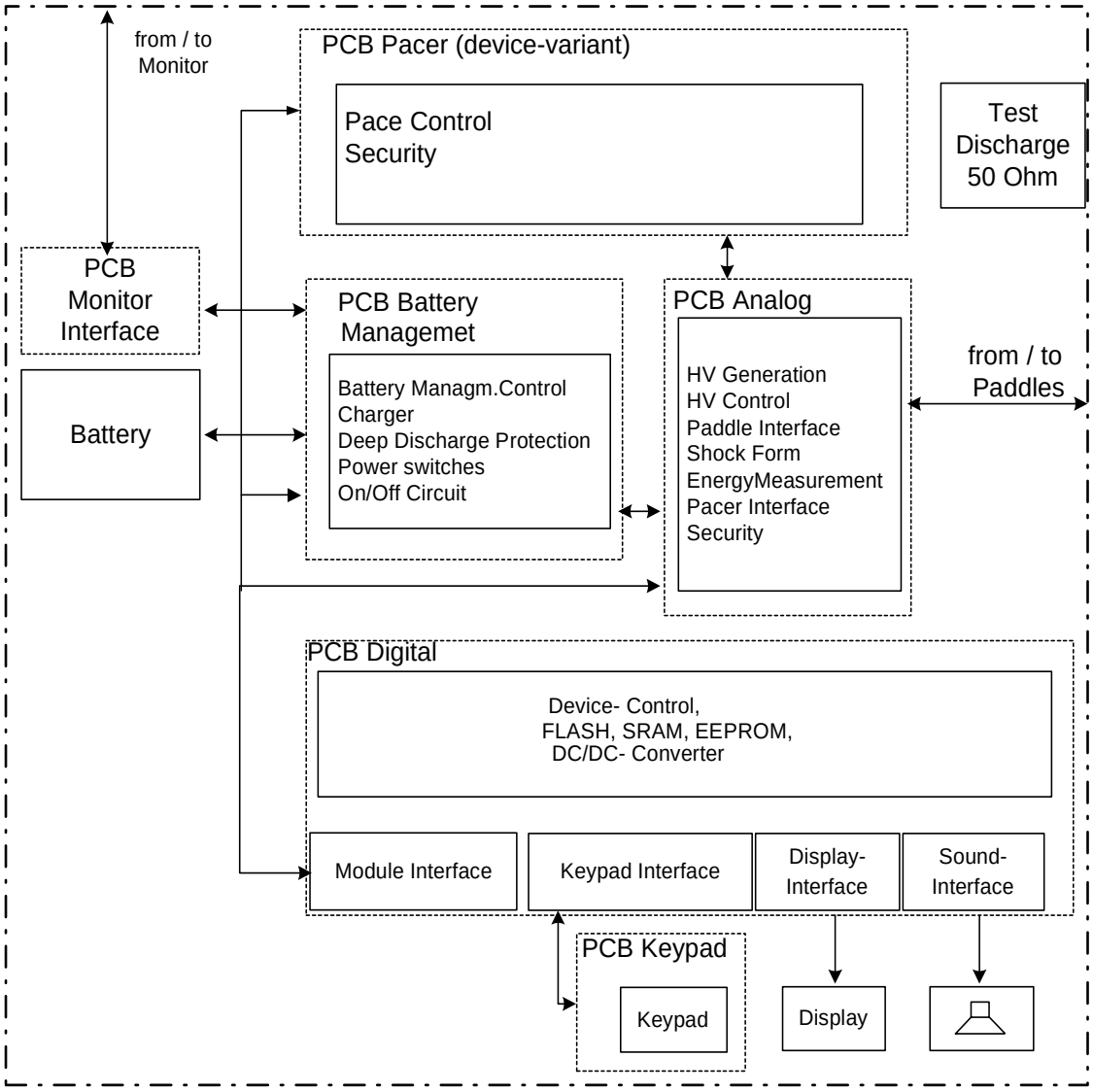
The master record index lists the valid configurations for the Dash Responder. Numbers for all permissible components of the device are listed. Spare part numbers are provided where available.

Instrument Versions of the Dash Responder

CAT No	*Description*
2002550-001	DASH RESPONDER, MANUAL
2002550-002	DASH RESPONDER, MANUAL, PACER

3 General Description

Dash Responder Block Diagram



Dash Responder Device

PCB Analog

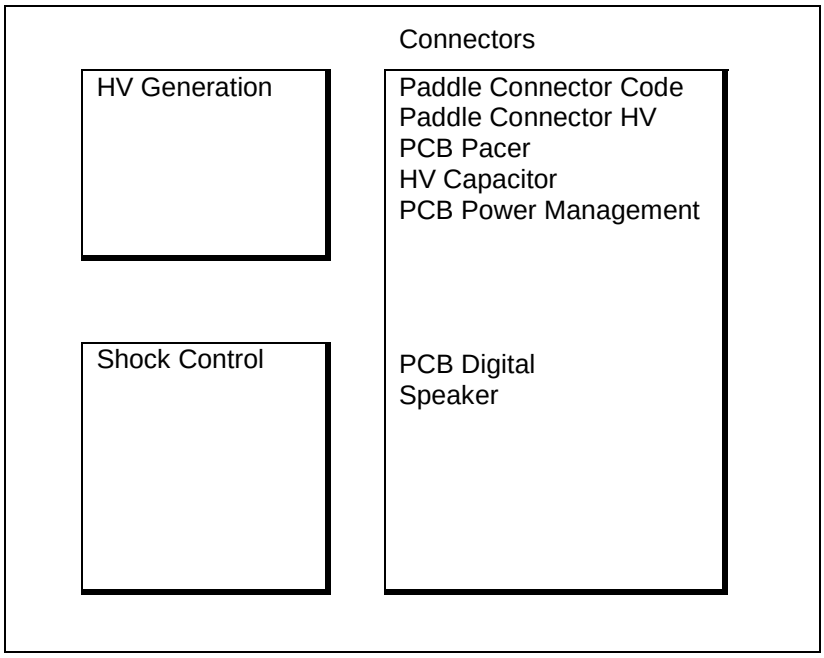
Block Diagram

The PCB Analog provides the following functions:

- Charging of the High-Voltage Capacitor.
  The PIC-controllers initiate the charging of the high voltage capacitor to a voltage provided by the main software on the PCB digital. One PIC supervises the other during the charging to make sure, the selected voltage will not be exceeded. In the next charging cycle the PICs change place and the first is supervised by the second.
- Shock delivering and measuring of applied energy.
  The PIC-controllers initiate the switching of the relais to deliver the energy to the patient according

to a command sequence of the main software. The energy which was delivered to the patient is measured and the value transfered to the main software.

Block Diagram PCB Analog (2002316-001)



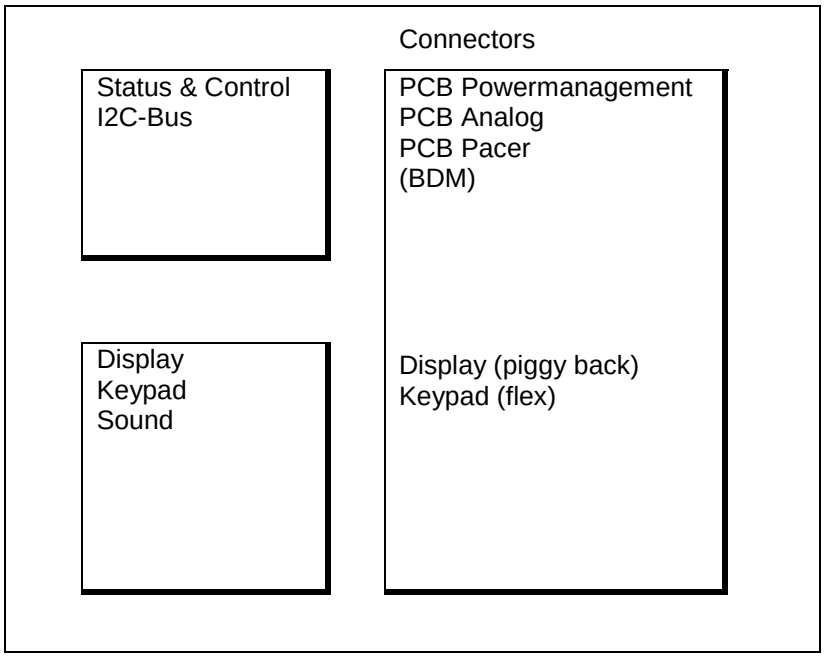
PCB Digital

Block Diagram

The PCB Digital provides the following functions:

- Control of all subsystems (Powermanagement, Analog, Pacer).
- Display
  The display is connected to the PCB Digital that contains a graphic controller.
- Keypad
  Any pressed keys are decoded by the PCB Digital and the LEDs on the keypad get illuminated under control of the PCB Digital.
- Sound generation
  The alarm sounds are generated and amplified on the PCB Digital by a sound chip.

Block Diagram LPL Digital



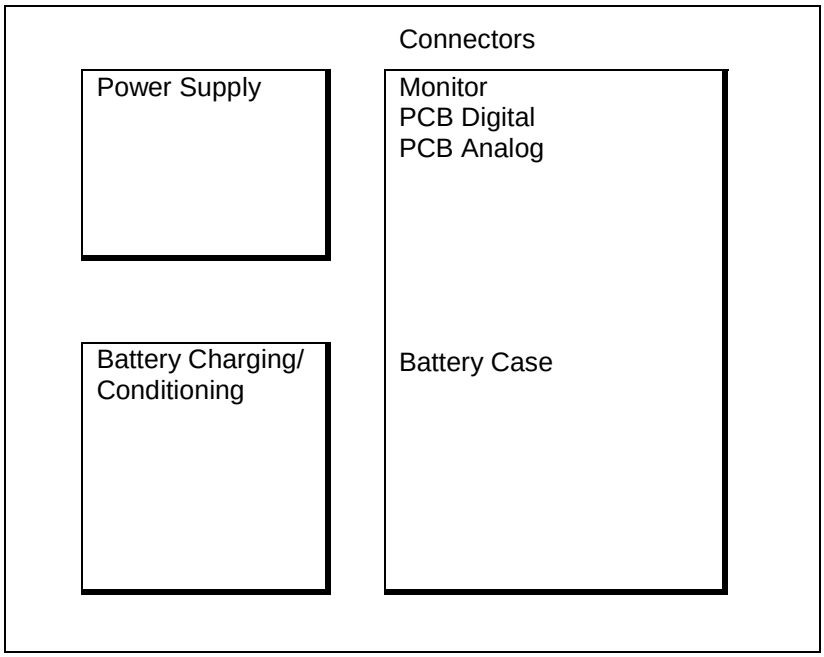
PCB Power Management

Block Diagram

The PCB Powermanagement provides following functions:

- Charging and Conditioning (Discharge / Charge-cycle) of the battery
  The battery gets charged if it needs to be and if energy is provided by a monitor connected to the Dash Responder. The PCB Powermanagement powers the device and guarantees that every remaining energy from the monitor is used to charge the battery, but the drawn current does not exceed the maximum current the monitor is able to deliver.
  During the conditioning cycle the battery gets fully depleted and afterwards fully recharged to regain the optimal energy level.
- Communication with the battery charge level monitoring system which is integrated in the battery
  In the service menu the energy level of the battery and the number of conditioning cycles are given.
- Unregulated Power supply for subsystems
  The Powermanagement regulates the supply voltage to a value that the battery gets charged if needed and the supply current drawn from the monitor so that the maximum current is not exceeded.

Block Diagram PCB Power Management



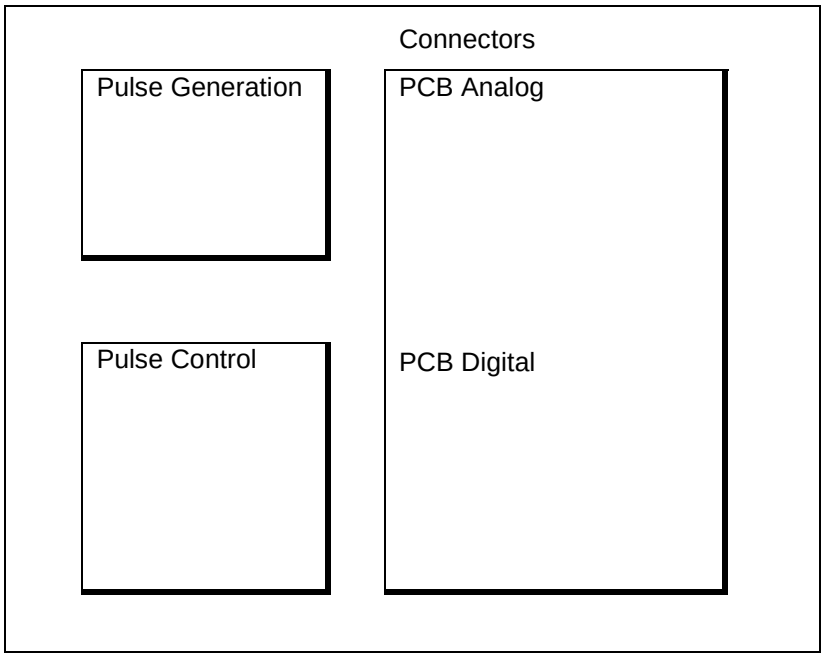
PCB Pacer

Block Diagram

The PCB Pacer provides following functions:

- Generation of floating HV
  The generated voltage level is sufficient to deliver any selected current level to the highest expectable patient resistance.
- Switched current source for pace pulses
  The pace pulse current is regulated by means of a programmable current source.

Block Diagram PCB Pacer



Battery

The battery in the Dash Responder is a rechargeable NiCd battery with a charge level of 2000 mAh and nominal 12 Volt (10 cells).

The battery contains a charge level monitoring system to measure the remaining charge in the battery. By pressing the key on the battery front the actual charge level can be displayed.

Nevertheless, the displayed charge level provides no information about the quality and usability of the battery. A worn out battery may still possess its capacity but—as a result of an increased internal resistance—is only partially operational in the defibrillator. The batteries should be periodically tested in the ASU 3000.

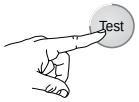
Batteries 2009219-001

General Information

Rechargeable batteries require special maintenance and continued checks to assure they function in emergency situations. It is normal for batteries of this type to self-discharge, even when the device is switched off or in storage.
Furthermore, the battery capacity decreases with age: the storage capacity of older batteries is less than that of new batteries. By regular maintenance (charging and discharging at regular intervals) the battery service life can be considerably extended.
Battery type 2009219-001 allows you to determine the charge level and capacity at any time.
Furthermore, the LEDs on these batteries indicate

- the presence of a short-circuit (a distinction is made between a short-circuit in the device (excessive current drain) and a short-circuit between battery cells),
- a display problem,
- the imminent shut-down of the display to protect the battery from over-discharging.

Indication of charge level and capacity

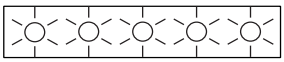
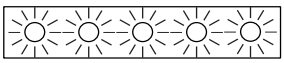


LED	charge	capacity
●●●●●	100 %	100 %
○●●●●	60 ... 80 %	100 %
○○●●●	40 ... 60 %	100 %
○○○●●	20 ... 40 %	100 %
○○○○●	6 ... 20 %	100 %
○○○○☼	0 ...6 %	100 %
☼●●●●	100 %	< 80 %
☼☼●●●	100 %	< 60 %
○○○○○	depleted, display off	

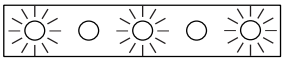
key to symbols

○	LED off
●	LED on
☼	LED blinking slowly
☼	LED blinking rapidly

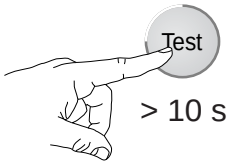
Indication of short-circuit

LED	what it means	comment
	short-circuit in the device	disconnect battery from device
	short-circuit of battery cells	battery defect, battery cannot be used any more

Fault indication

LED	what it means	comment
	electronics fault	perform reset; if problem persists, battery cannot be used any more

Perform reset



For a reset, the TEST button needs to be pressed longer than 10 seconds. It is recommended to perform a reset each time a fault is indicated. If the fault indication persists, the battery is defective and cannot be used any more.

Automatic shut-down of the display (protection from deep discharging)

To protect the battery from deep discharging, the display shuts down automatically. The imminent shut-down is indicated by running lights, with each of the 5 LEDs blinking in sequence for about 1 second. The display reactivates automatically when the battery is being charged.

Battery conditioning

The battery should be conditioned with the internal battery conditioning program or with the optional battery charging unit ASU 3000 every month. As the ASU 3000 is a specially designed battery charging unit that has a definite conditioning mechanism, it is advisable to use it to condition the battery. Furthermore the conditioning cycle will last about twenty-one hours if performed in the defibrillator and only five hours in the ASU 3000.

NOTE

Since the battery will be discharged in the course of the program and the program takes several hours to complete, a second charged battery must be available to ensure that the defibrillator is ready for use.

The conditioning program can only be run when the defibrillator is connected to the patient monitor and the monitor, in turn, is connected to the power line.

Start of Conditioning

- Connect the monitor-defibrillator system to the power line.
- Turn the defibrillator on.

- Display the main setup menu by simultaneously pressing the two ENERGY SELECT keys (at least 2 seconds).
- Use the ENERGY SELECT key to highlight SERVICE MODE and confirm the selection with the CHARGE key.

The SERVICE MODE menu appears.

- Select BATT COND with ENERGY SELECT key and confirm with CHARGE key.

You will see the battery conditioning menu.

- Select COND START with ENERGY SELECT key and initiate the conditioning program with CHARGE key.

These are the steps of the conditioning program:

the Dash Responder switches off,

the battery charges (up to about seven hours, depending on the initial energy level), the green LED blinks, the yellow LED is solid on

the battery discharges (seven hours), the green LED blinks, the yellow LED is off

the battery charges (about seven hours), the green LED blinks, the yellow LED is solid on

The two CHARGING STATUS indicators signal the steps of the conditioning program:

green LED	**yellow LED**	**conditioning program step**
blinks	on	battery charging
blinks	off	battery discharging
blinks	blinks	charging error (defective battery)

In the course of the program you can display the battery conditioning menu at any time to view the battery status or to stop the program.

- Turn on the defibrillator to display the battery conditioning menu.

The battery status is not updated automatically when the battery conditioning menu is displayed; for displaying a new status leave and enter again the conditioning menu.

Defective Battery

As soon as the battery quality (“F/NEW”) drops to 60% or less, the battery must be replaced by a new one.

Battery replacement

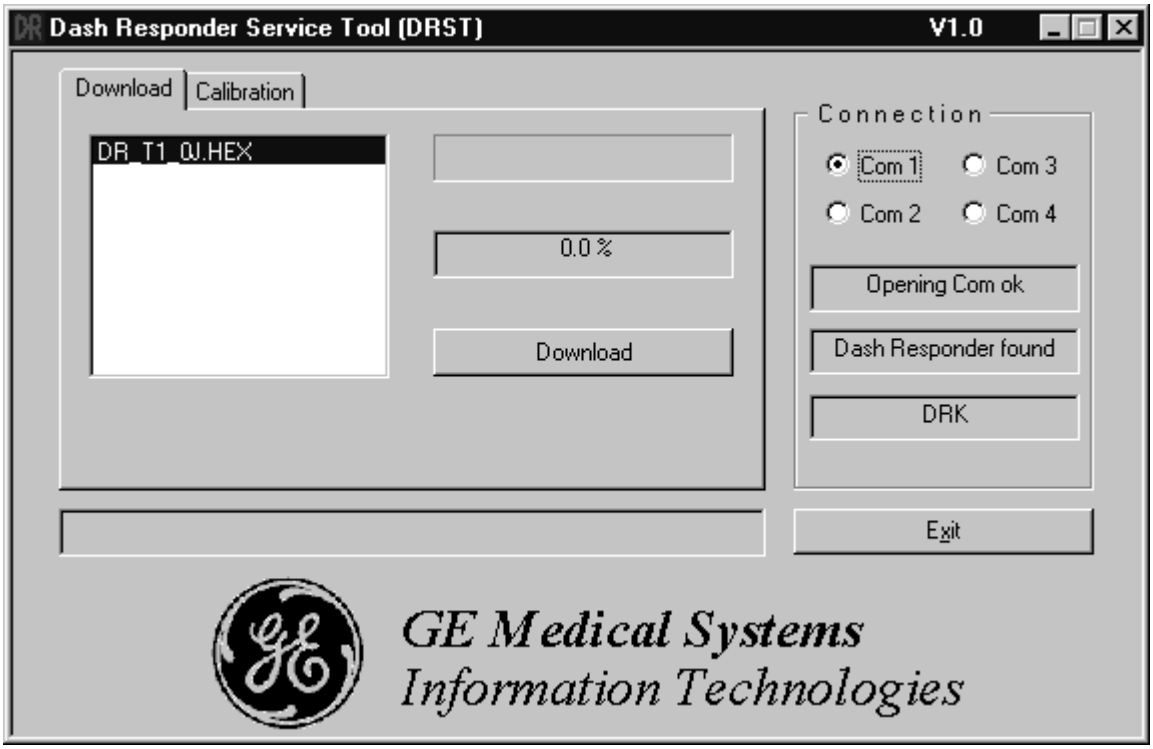
NiCd batteries have a limited service life time as their storage capacity deteriorates with age. For this reason, the battery must be replaced every 2 years.

Note

Disposal Notice: Should this product (battery) become damaged beyond repair, or for some reason its useful life is considered to be at an end, please observe all local, state, and federal regulation that relate to the disposal of products that contain lead, batteries, plastics, etc.

4 Service Tool

This Service Tool is suitable for testing of the Dash Responder and Dash Monitor separately, further for software download and calibration of the Dash Responder.



Software Download Information

The product software for the Dash Responder can be loaded into the flash memory by means of a PC or laptop. This requires the Dash Responder Service kit, a complete set for download, calibration and test.

The kit (2006861-001) can be ordered from GE Medical Systems, please contact your local distributor; it includes

1. software diskette,
2. DRST-Box (2005378-001) for adaptation,
3. DC power supply (2000300-001),
4. PC cable assembly (223 362 03).

Additional you need

- power cord for the power supply
- PC/laptop with
  - Microsoft Windows 95 / 98 / NT / Windows 2000 or Windows Millennium.
  - RS-232C serial port (COM).
  - 3.5-inch floppy drive

When updating to a newer software version, please order the corresponding User Manual separately. (see Spare Parts List on page 64)

For authorized dealers (password required) the software download can be carried out via the following Internet address:

http://213.164.65.40/octodata/osmh21.nsf/$start/homepage

Important servicing information:

1. Before loading a new software write down the actual device, defib and pacer setup (see *User configurable settings* on page 23).
2. After replacing any of the PCBs', energy calibration has to be done. (For more details see Section *Calibration* on page 20).

Installation

1. Create a directory on your hard disk (e.g., `stools`) and copy the service program '`drst.exe`' into this directory as well as the software file(s) (`*.hex`) for the product software.
2. Attach the DRST-Box to the Dash Responder instead of a Dash Monitor.
3. Connect the power supply and the serial cable to the DRST-Box. The other end of the serial cable should fit into a free COM-port of your PC. You may need a standard 9pin/25pin adapter if the PC has a 25-pin socket COM.
4. The application software for the Dash Responder comes on a separate floppy disk.

Software Download

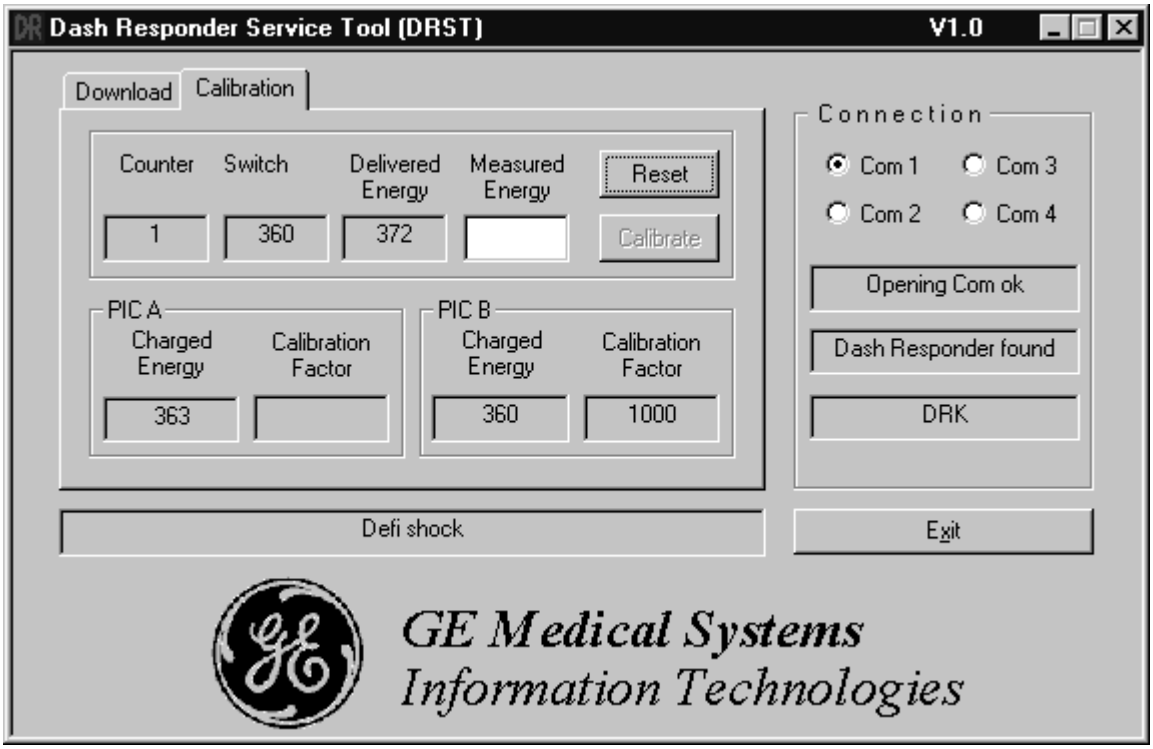
1. The product software must be available in the same directory as '`DRST.exe`'.
2. Check at the DRST-Box that
   - the LED PERIPRESENT is ON and
   - the Switch '9-18V' is ON.
3. Read out all user specific setup and write it down (see *User configurable settings* on page 23).

Start the Bootloader following these steps

- Switch off the defib
- Hold down the CHARGE and left SHOCK key simultaneously.
- Press and release the ON/OFF key.
- Release the CHARGE and the left SHOCK keys simultaneously when the SYNC LED and SHOCK LED are blinking alternately.
- Start `'DRST.exe'` on the PC and select the serial interface (COM 1…4) you chose to connect the Dash Responder. If the connection is correct, 'RESPONDER FOUND' is displayed.

4. Now select the desired software in the download window (`*.hex`) and click on 'DOWNLOAD'. After successful installation of the software (duration about 3 minutes), the message 'END DOWNLOAD' appears in the bottom line of the service tool window. The Dash Responder restarts.
5. Enter the previous setup (see *User configurable settings* on page 23).

Calibration



The accuracy of the shock energy measurement needs to be checked on a regular basis (see *Maintenance and Technical Inspection* on page 54) and after any replacements of PCBs or update of the software.

CAUTION

No more than 16 shocks can be applied without a pause of about 15 minutes afterwards to avoid overheating of the device!

Check the current calibration first:

Apply **two** shocks with each 50 J, 100 J and 360 J to a calibrated defibtester (e.g. DNI Nevada Inc.). If any of the delivered energy values deviates for more than ± 5% from the chosen value calibration is required.

The calibration procedure requires

- Dash Responder Service kit (2006861-001)
- PC/Laptop
- calibrated defibtester with energy display (e.g. DNI Nevada Inc.)
- hard paddles or the adapter cable for the adhesive paddles which are suitable for the used defibtester.

NOTE

The charge level of the battery should be sufficient for several shocks.

The following steps describe how to calibrate the Dash Responder

1. Connect the DRST-Box to the Dash Responder and the PC (COM 1 - 4).

Check at the DRST-Box that

- the LED 'PERIPRESENT' is ON and
- the Switch '9-18V' is OFF for software version V 1.0
- the Switch '9-18 V' is ON for software version V1.01 and higher versions

2. Switch ON the defib.
   Enter MAIN MENU by pressing both ENERGY SELECT keys simultaneously for 2 sec. Select SERVICE MODE -> SERVICE TOOLS -> CALIBR.
3. Start the program `'DRST.exe'` on the PC, select the 'Calibration' sheet and the serial interface you chose to connect the Dash Responder. If the connection is correct, 'DASH RESPONDER FOUND' is displayed.
4. Now deliver a 360 J shock into the defibtester**.**
   It is important to shock immediately after charging (sound indicator)!
5. Read the measured energy value from the defibtester, calculate
   $$new\_value = \frac{(360J + energy\_value)}{2}$$
   and enter the calculated *new_value* into the window 'MEASURED ENERGY' next to the 'CALIBRATE' key and click on the 'CALIBRATE' key. The message 'WAITING FOR SECOND SHOCK' appears.
6. The 2nd shock is now delivered to the defibtester, then the energy calculated as above has to be entered into the window 'MEASURED ENERGY' next to the 'CALIBRATE' key. This value is adopted by the Dash Responder by clicking on the 'CALIBRATE' key. The message 'START CALIBRATION' appears for approx. 1 seconds followed by the message 'END CALIBRATION'.
7. Exit SERVICE MODE:
   Select EXIT CALIBR ->MAIN MENU

IMPORTANT NOTE

Select **SAVE & EXIT** if you want to save the calibration values or
EXIT for **not** changing the calibration.

8. Restart the defib with the ON/OFF key**.**

CAUTION

If calibration should not be possible (defibrillator does not charge up) due to an incorrect entry (message 'INCORRECT CALIBRATION FACTOR ...' occurs), press the reset button and repeat the calibration.

Evaluate the results of the calibration with energy levels of 50 J, 100 J and 360 J.. The accuracy levels that must be gained are listed in the table Accuracy of Shock Energy on page 57.

Monitor Interface test

The Monitor Interface can be tested without a Monitor (if not available or not ready) using the service tool kit Dash and a PC/Laptop (see *Software Download Information* on page 18).

Installation

1. Create a directory on your hard disk and copy the service program '`DRTest.exe`' into this directory.

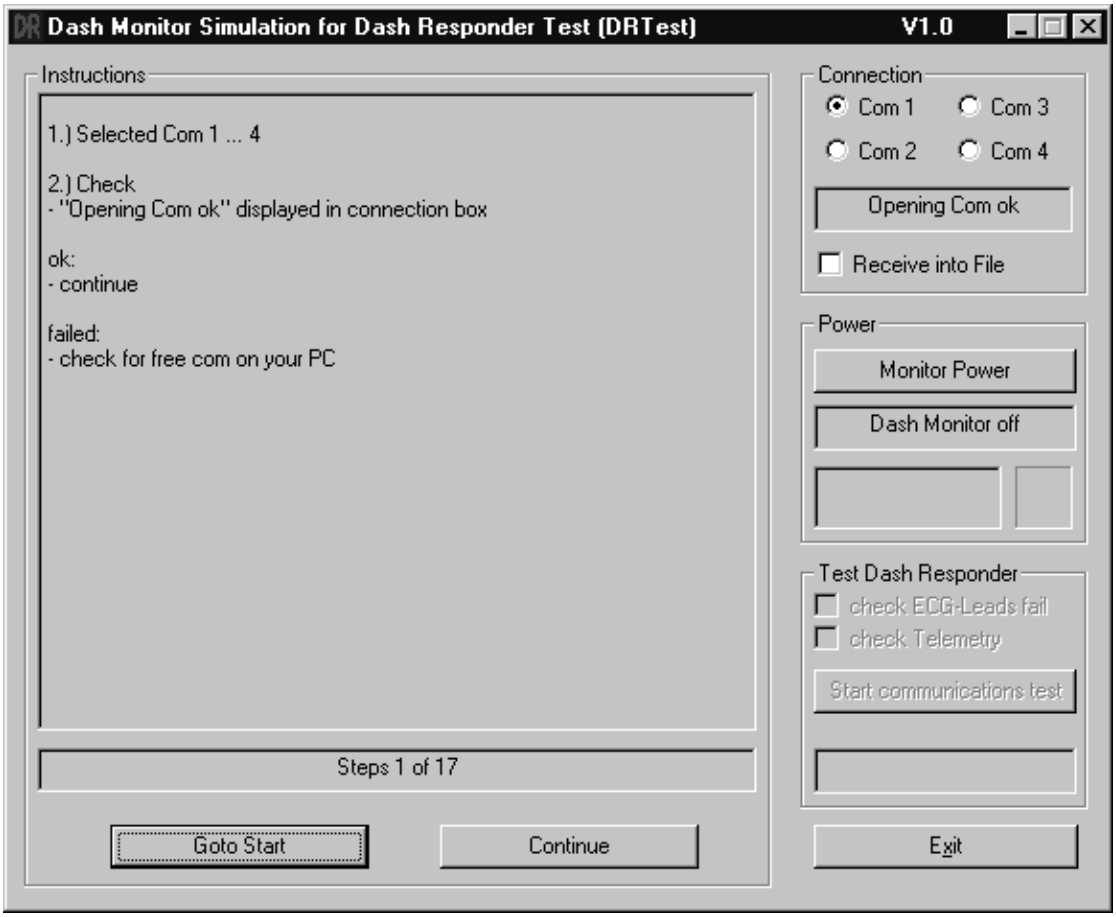
2. Attach the DRST-Box to the Dash Responder instead of a Dash Monitor.
3. Connect the power supply and the serial cable to the DRST-Box. The other end of the serial cable should fit into a free COM-port of your PC. You may need a standard 9pin/25pin adapter if the PC has a 25-pin socket COM.

Interface Test

Switch off the Dash Responder.

- Start the test by executing '`DRTest.exe`'.

Follow the steps in the instruction window.



NOTE

The pushbuttons 'MONITOR POWER' and 'START COMMUNICATION TEST' are on the right side of the window.

5 Service Menu

The SERVICE MENU can be reached by pressing the ENERGY SELECT keys simultaneously for at least two seconds.

User configurable settings

Some settings of the Dash Responder are configurable to meet the user's requirements. The settings can be made in the Service Menu and comprise following values:

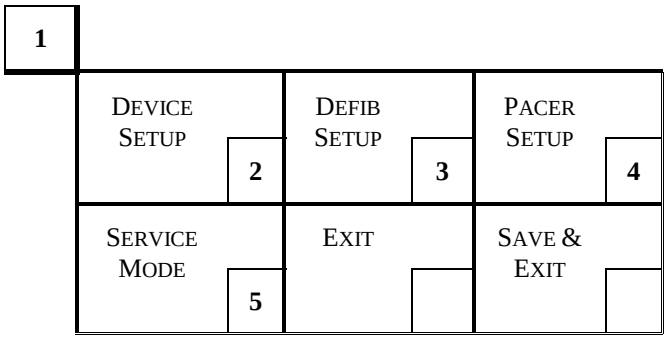
- Volume of the alarm sound
  SERVICE MODE / DEVICE SETUP / ALARM <LOW | MEDIUM | HIGH>
- Automatic shutdown
  SERVICE MODE / DEVICE SETUP / SHUTD <ON | OFF>
- User Language
  SERVICE MODE / DEVICE SETUP / LANGUAGE < ENGLISH | DEUTSCH | … >
- Autosequence of defib shocks
  SERVICE MODE / DEFIB SETUP / LEVEL1 <150 J | 200J | 300 J | 360 J>
  SERVICE MODE / DEFIB SETUP / LEVEL2 <150 J | 200J | 300 J | 360 J>
  SERVICE MODE / DEFIB SETUP / LEVEL3 <150 J | 200J | 300 J | 360 J>
- Pacer Rate
  SERVICE MODE / PACER SETUP / RATE < 30 … 200 PPM>

Component Test
Service Mode / Comp Test

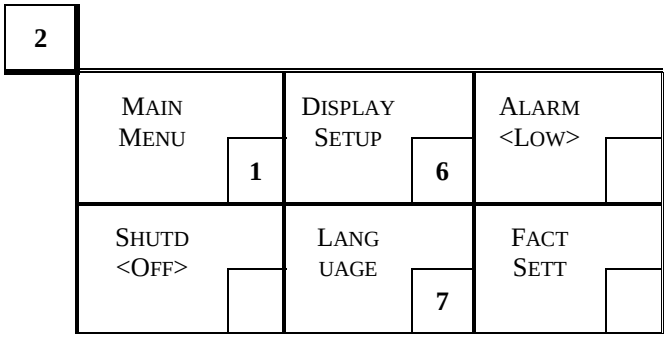
Keyboard Test
SERVICE MODE / COMP TEST / KEY TEST
Press the keys for at least one second

Structure of the Service Menu

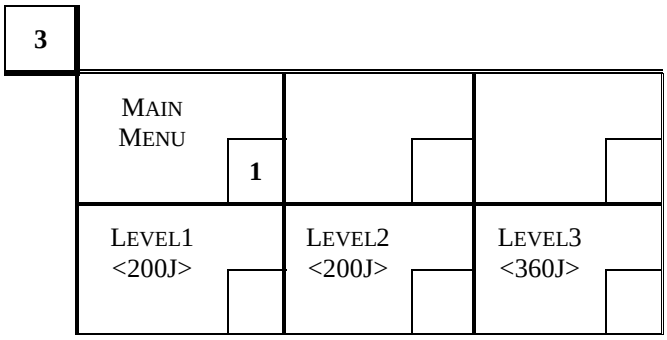
Main Service Menu



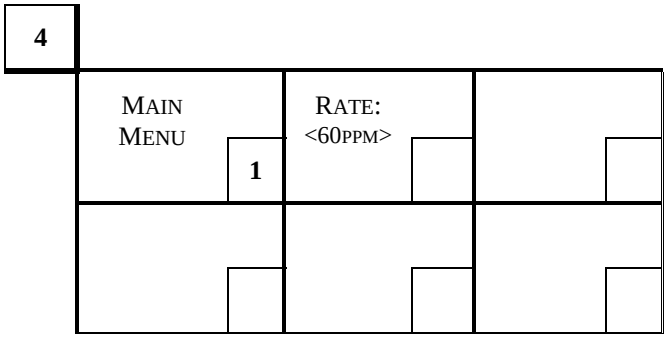
Device Setup



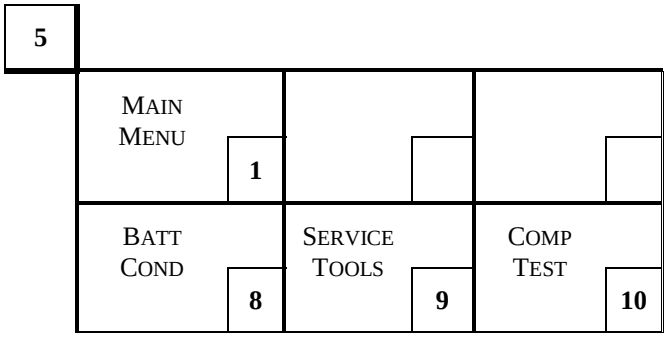
Defib Autosequence Setup



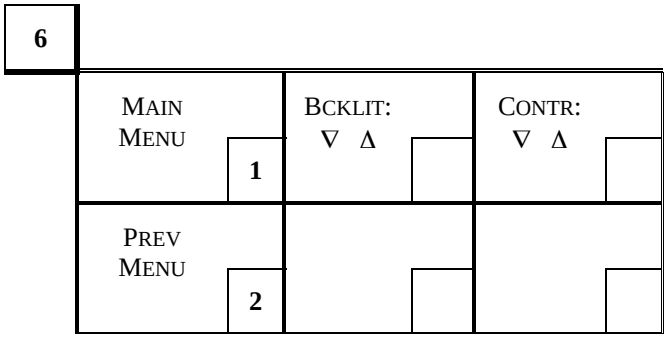
Pacer Setup



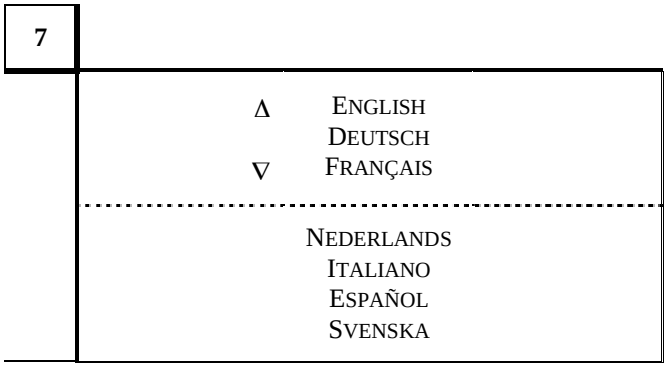
Service Mode



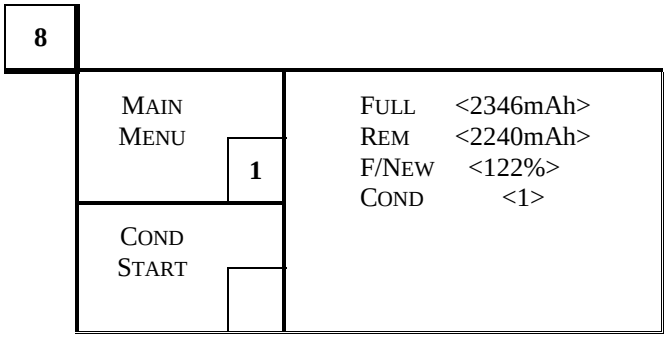
Display Setup



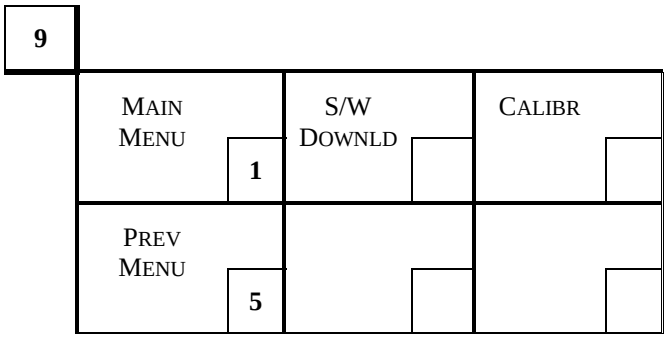
Language Setup



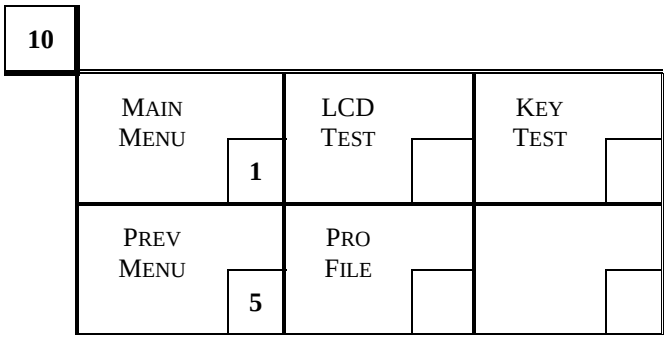
Battery Conditioning



Service Tools



Component Test



6 Replacing PCBs

Safety Information for Disassembly

Please observe the following safety information when disassembling the defibrillator.

All PCBs contain semiconductors which must be protected from electrostatic discharge. When working on open devices and when handling PCBs, it is important to observe ESD safety precautions. Please read also the paragraph *Electrostatic Discharge (ESD)* on page 33. It is especially important that service personnel always establish contact between the PCB and ground before touching a component.

Use the following ESD protection guidelines when working on an open defibrillator or when handling PCBs.

- Use an ESD protective underlay connected to a non-fused earth conductor potential.
- Connect yourself to the ESD protective underlay via an armband.
- Use an ESD protective travel bag to transport PCBs.

The following tools may be required for disassembling the unit:

- Goose-necked tweezers
- Phillips Screwdriver, Type “Phillips-recess” sizes 0, 1 and 2
- Swivel wrench 7 mm for hexagonal spacers
- ESD packaging for PCBs
- ESD underlay with armband

NOTE

The Checkout Procedures and Electrical Safety Tests must be performed each time the device has been opened, a circuit board is removed or replaced.

Disassembly Procedure

Before any service interventions, turn off the device and remove the battery.

Opening Unit

To open the unit, do the following:

- Lay the defibrillator upside down on a clean, level surface (ESD pad) which is placed on a soft material.
- Undo the 4 buried screws on the bottom beneath the feet of the device to dismount the upper and the lower shell of the case.
- Turn the device upright again and lift off the upper shell of the case. This can be done by lifting the shell at the back by a small amount and pull it to the front until the front shell disconnects from the lower shell. Then turn the upper shell to the right and thereby open the device.
- Disconnect the connectors of the Analog PCB and the Pacer PCB.

Analog PCB

Disassembling

- Disconnect the two connectors to the paddle connector on the rear of the unit. One connector (PC/) is located at the left side of the air coil (L506) the other one (SHOCK_P/, SHOCK_M/) is

located at the right side of the coil.
SHOCK_P/ and SHOCK_M/ should first be lifted with a goose-necked tweezers to loosen them and afterwards disconnected.

- Disconnect the connectors to the HV-Capacitor.

CAUTION

Short circuit the capacitor as long as it is not in use, because it can show up a lethal voltage after a certain amount of time if not short circuited.

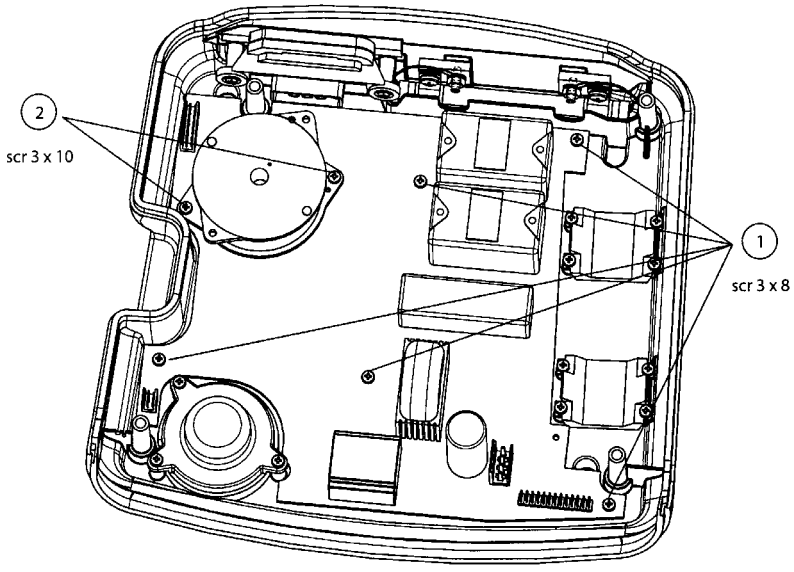
- Cut the two cable ties that fix the HV-Capacitor and remove the Capacitor.
- Undo the seven screws on the Analog PCB. Remember that the two screws that mount the air coil are a little bit longer than the others.
- Remove the Analog PCB and put in a ESD packing.

CAUTION

Don't handle the Analog PCB on the air coil (L506), otherwise its thin wires could break.

Reassembling

- To reassemble the Analog PCB follow the steps mentioned in the assembling description in reverse order.
- Remember the two screws fixing the air coil are a little bit longer than the other five that fix the PCB.
- When reassembling the HV-Capacitor make sure the insulation foil is properly placed. The foil has to be wrapped around the capacitor so that the joint is located in the middle of the lower side of the capacitor.
- Fasten the capacitor on the bracket with two cable ties (360mm * 7,5mm).



Analog PCB

Digital PCB

Disassembling

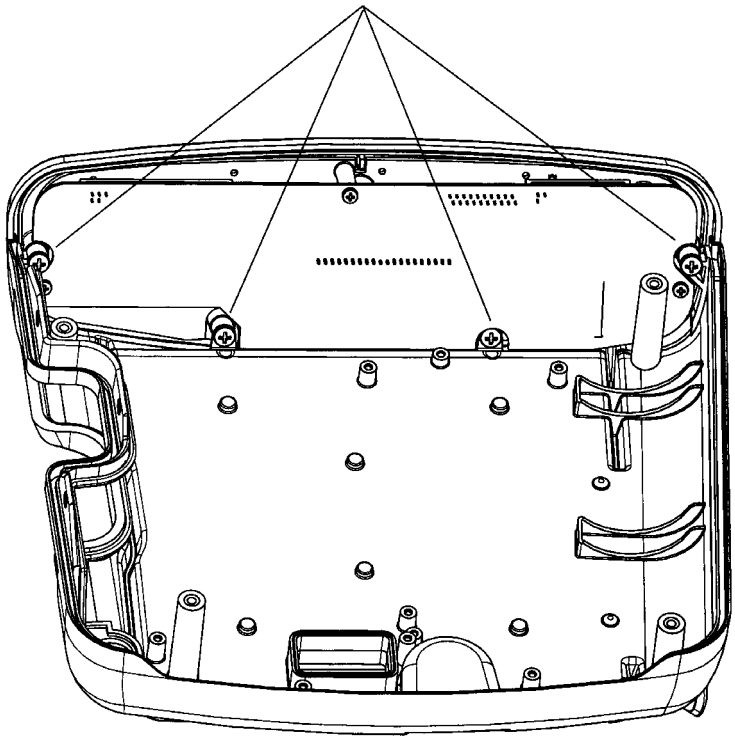
NOTE

The Power Management PCB / Battery Case and the Pacer PCB have to be removed before removing the Digital PCB (see disassembly procedure for *Power Management PCB / Battery Case* on page 30 and disassembly procedure for *Pacer PCB* on page 29). Otherwise no access to all screws is possible.

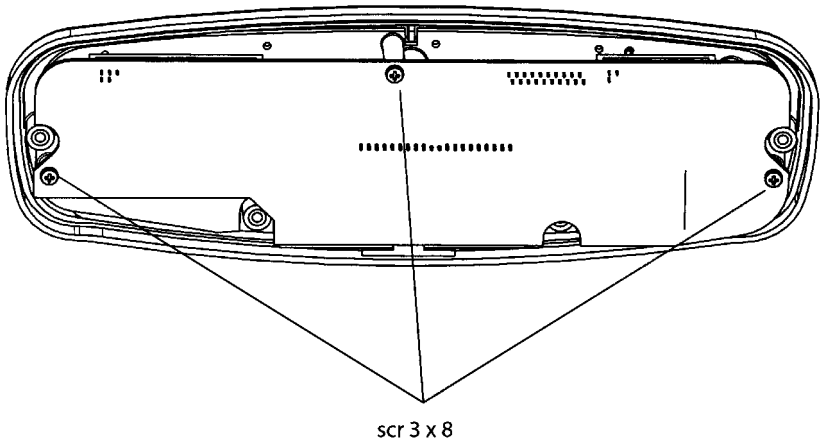
- Undo the big screws to dismount the front from the upper case shell.
- Disconnect the flex flat cable to the keypad. Be careful not to crack the flex cable!
- Undo the screw of the Digital PCB to remove the PCB.
- The display can be removed from the Digital PCB and replaced by a new one.

Reassembling

- Connect the Digital PCB with the front case shell by inserting the pins of the display connector in the socket on the Digital PCB. Be careful not to bend any of the pins.
- Fix the PCB with its three screws.
- Connect the flex flat cable to the keypad. This can best be done with a goose-necked tweezers. Make sure to fasten the actuator properly.



Front case



Digital PCB

Pacer PCB

Disassembling

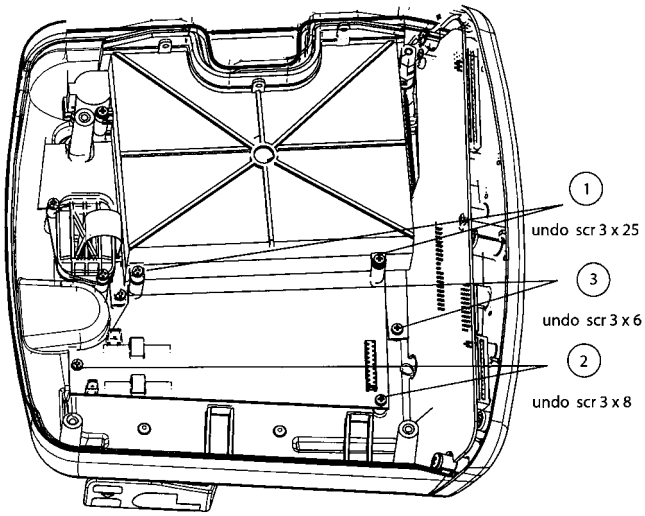
CAUTION

Wait a few minutes before dismounting the Pacer after it has been in use, because it can hold a harmful voltage for several minutes.

- Disconnect all connectors to the Pacer PCB.
- Undo the two screws that fix the Pacer PCB to the upper case shell.
- Undo the two screws that fix the Power Management PCB to the upper case shell near the Pacer PCB.
- Undo the two screws that fix the battery case as well as the Pacer PCB to the case shell.
- Lift up the battery case from the upper shell of the case and pull out the Pacer PCB under the battery case.

Reassembling

- First remove the four screws that fix the battery case / Power Management PCB to the upper case shell on the back of the battery case.
- Loosen the screw that fix the battery case to the upper case shell that is located beneath the unlock button of the battery. This screw also fixes the EMC-foil of the Power Management PCB to the upper case shell.
- Reach into the battery case with one hand and lift it at its back so that the Pacer PCB can be pushed under the bolts of the battery case.
- Mount the Pacer PCB with the screws to the upper case shell.
- Remount and fasten the screws of the Power Management PCB.
- Connect the flat ribbon cable from Digital PCB to Pacer PCB.
- Make sure the flex flat cable of the monitor connector receptacle didn’t get loose during mounting the Pacer PCB. Reconnect and fasten it if necessary.



Power Management PCB / Battery Case

Disassembling

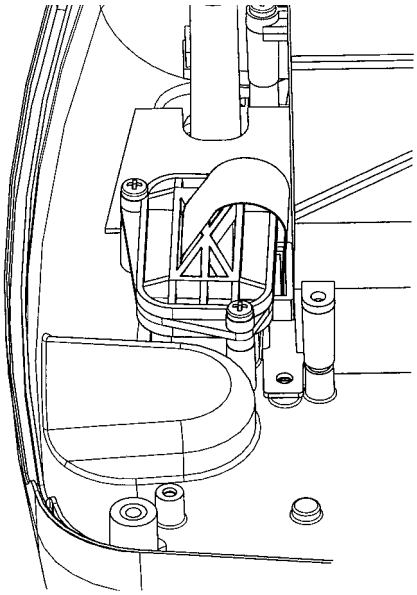
- To dismount the Power Management PCB the monitor connector receptacle must be removed first.
- Carefully disconnect the flat flex cable to the monitor connector. The flat flex cable is locked in the socket. Loose this actuator by lifting it on both sides with a goose-necked tweezers.
  Don't bend the cable to avoid cracks in the wires!
- Undo the screw that fix the monitor connector receptacle to the upper case shell.
  Carefully remember the orientation of the flat flex cable versus the receptacle. Pay attention to the orientation of the contacts on the flex flat cable in regard of the socket on the Power Management PCB. The contacts are located on the side which is opposite to the battery case. In this orientation the cable must be reassembled later.
- Remove the monitor connector receptacle.
- Disconnect the cable to the Analog PCB and the flat ribbon cable to the Digital PCB.
- Undo the screws of the battery case and the hexagonal threaded bolt. Undo the three countersunk screws on the front of the battery case.
  Remember the different lengths of the screws.
- Remove the whole battery case with the Power Management PCB mounted on it.
- The Power Management PCB can not be removed from the battery case. The spare part consists of the Power Management PCB mounted on a new battery case.

Reassembling

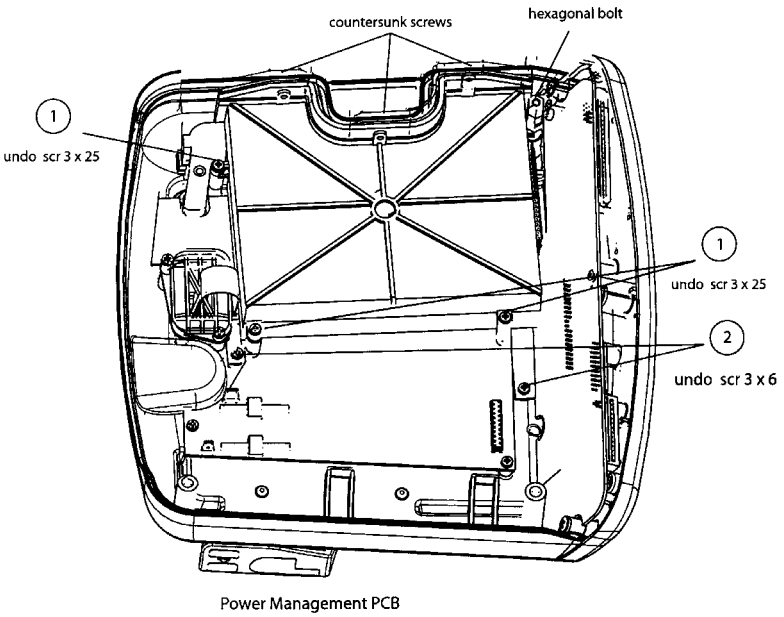
NOTE

Before reassembling the Power Management PCB the Digital PCB should be reassembled.

- To reassemble the Power Management PCB the monitor connector receptacle has to be reassembled first.



- Put the receptacle through the hole in the upper case shell. Make sure that the orientation of the receptacle is right. The flex flat cable has to protrude out of the rubber part of the receptacle on the side located to the back of the upper case shell. Regard the notch in the joint between the rubber part of the receptacle and the (outer) plastic part. This notch has to be located to the back side of the upper case shell. Fix the monitor connector receptacle with the screws.
- The flat flex cable should be placed in the socket on the Power Management PCB before reassembling the Power Management PCB to the device.
  Make sure that the flex flat cable is inserted completely and perpendicular to the socket. Secure it by fasten the actuator.
- Carefully push the battery case into its place in the upper case shell. Make sure the rubber seal around the opening of the battery case gets located in the frame properly. Be careful that the flex flat cable doesn't get cracked.



Power Management PCB

High-Voltage Capacitor

Disassembling

CAUTION

Short circuit the capacitor as long as it is not in use, because it can show up a lethal voltage after a certain amount of time if not short circuited.

- Make sure that the HV-Capacitor contains no energy. If you are in doubt, that the discharging circuit could not work properly, measure the voltage on the capacitor with an appropriate voltage meter. Discharge the capacitor if necessary by means of resistors of about 60kOhms/10 W. After 30 seconds capacitor is completely discharged.
- Cut the two cable ties that fix the HV-Capacitor and remove the Capacitor.
- Lift the capacitor of its sockets and remove the cap that cover the connector terminals at the top and the cap that covers the bottom of the capacitor.
- Disconnect the connectors from the capacitor.
- Remove the plastic insulation foil.
- Short-circuit the terminals of the capacitor by an appropriate blank wire. (Hint: Use the wire that short-circuits the replacement capacitor for this purpose.)

Reassembling

- Remove the short-circuit wire on the terminals of the replacement capacitor.
- Wrap the insulation foil around the capacitor so that the edge of the foil is placed in the middle of the side of the negative (‘-‘) terminal of the capacitor and the end of the foil coincides with the bottom of the capacitor.
- Put the cap on the bottom of the capacitor.
- Connect the wires to the capacitor; use the inner terminals. Beware the polarity!
- Put the cap on the top of the capacitor to cover the connection terminals.
- Thread new cable ties in the sockets for the capacitor.
- Put the capacitor on the sockets in the Dash Responder and fix it with the cable ties.

CAUTION

Check that the Dash Responder is loaded with minimum Software Version 1.01

7 Troubleshooting Tips

Electrostatic Discharge (ESD)

CMOS Components

The defibrillator makes extensive use of CMOS components because they are more immune to noise and consume less power than standard TTL or NMOS components. However, CMOS components are inherently more susceptible to electrostatic discharge (ESD) damage than other types of semiconductor materials. ESD damage, causing a weakening or complete breakdown of p-n junctions within multilayer semiconductor substrates, can range from slight degradation to catastrophic failure. Slight degradation usually results in intermittent failure of the affected component catastrophic failure results in rendering the affected component permanently unusable. Although CMOS components may be more sensitive to ESD, all semiconductor devices are susceptible to ESD damage.

All external connector inputs and outputs of the defibrillator are designed with protection from ESD damage. However, if the defibrillator requires service, exposed components and assemblies contained within are susceptible to ESD damage. This includes human hands, non-ESD protected work stations and/or improperly grounded test equipment.

The following guidelines help make a service workstation more resistant to the ESD damage:

- Discharge any static charge you may have built up before handling semiconductors or assemblies containing semiconductors.
- A grounded, antistatic wristband (3M part number 2046 or equivalent) or heel strap should be worn *at all times* while handling or repairing assemblies containing semiconductors.
- Use properly grounded soldering and test equipment.
- Use a static-free work surface (3M part number 8210 or equivalent) while handling or working on assemblies containing semiconductors.
- **Do not** remove semiconductors or assemblies containing semiconductors from antistatic containers (Velo-stat bags) until absolutely necessary.
- Make sure power to an assembly is turned off before removing or inserting a semiconductor.
- **Do not** slide semiconductors or electrical/electronic assemblies across any surface.
- **Do not** touch semiconductor leads unless absolutely necessary.

Semiconductors and electrical/electronic assemblies should be stored only in antistatic bags or boxes.

These guidelines may not guarantee a 100% static-free workstation, but can greatly reduce the potential for failure of any electrical/electronic assemblies being serviced.

Special Components

Surface mounted devices are used to aid in miniaturizing the electrical/electronic assemblies within the defibrillator.

Surface mounted integrated circuits have legs that are soldered to rectangular pads on the surface of the printed circuit board (PCB), versus pin-through devices having legs that are made to be inserted into solder fillets protruding completely through a PCB. Surface mounted integrated circuits (ICs, SMD, PLCC) may have legs on either two or four sides of the IC. Another surface mounted technology are Ball Grid Array ICs (BGA) using soldering balls as electrical connections on the bottom of the components.

Surface mounted resistors, capacitors, and diodes have conductive parts acting as legs that are directly soldered to the PCB.

WARNING

Surface mounted components were **not** designed to be removed or replaced using standard soldering equipment. Removal of surface mounted components using a conventional soldering iron can

potentially destroy the PCB. Only soldering workstations specifically designed for surface mount technology may be used to remove and replace these type of components.

Battery Failure

Error Message: Battery Required

The Battery can not be detected by the defibrillator or is not properly inserted.

Check the battery contacts and the contacts of the battery case of the defibrillator.

Error Message: Battery Low

The battery is depleted to a remaining charge level of at least 5 Shocks with 360 J each. The battery can be charged in the defibrillator if a monitor is connected which, in turn, is connected to mains power. Another way to charge the battery is by the optional battery charging unit ASU 3000.

Charge level and battery status

The actual charge level and the "health" condition of the battery can be checked in the Setup Menu. (SERVICE MODE / BATT COND).

The indication of the "FULL" charge level in mAh gives the maximum charge level of the battery when it is fully charged.

The indication of the "REM" charge level in mAh gives the actual charge level of the battery.

The indication of the quotient "F/NEW" gives a hint of the "health status" of the battery as it states the maximal chargeable amount of energy that this battery can hold compared with the nominal capacity of a typical, already used battery. Therefore this indication can read a number greater than 100% because a new battery has a capacity higher than the nominal value.

A battery with less than 60% "F/NEW" charge level must be replaced. See also chapter *Battery conditioning* on page 16.

Charging Status Indicator

The Charging Status Indicators are:

- solid yellow while the battery is being charged
- solid green when the battery is charged
- blinking yellow when there is a charging problem

In case of a charging problem most probably the battery is defect and must be replaced.

Fault/Symptom Analysis

This information is provided for the benefit of service technicians responsible for the maintenance and repair of the monitor. The symptoms covered in this part of the Troubleshooting section represent only a selected number of faults that you may encounter and by no means are intended to cover every possible failure that may occur.

A systematic approach to the diagnosis of problems as well as a general understanding of the architecture, both hardware and software, of the defibrillator are essential to ensure successful troubleshooting of this device. The manufacturer recommends formal service training before repairs are attempted on the defibrillator. The Service Tips listed below combined with formal training should provide the service technician with skills necessary to service and repair a defibrillator, in the event of a malfunction.

Fault	Reason	Solution
The message ERROR <#> occurs during selftest	An error was detected during test of internal parts of the device.	Consider the table of error numbers on page 37 to get an idea of the error cause. Try to resolve the error or replace the PCB
Charging Status LED is not illuminated when Monitor is connected to the defibrillator	No power supply provided from monitor to defibrillator.	Connect the monitor to mains power line. Check if the monitor is properly placed on top of the defibrillator and the lever is engaged.

8 Error Messages and System Information

Messages

Overall Device

Message	Explanation
SHUTDOWN	message before the device switches off automatically
BATTERY REQUIRED	no battery inserted
DEVICE ERROR <#> SWITCH OFF TRY AGAIN	Internal Device error, device should not be used. Error number is a hint to the cause of the error. For Error numbers see page 37

Defibrillator

Message	Explanation
APPLY ELECTRODES	electrodes disconnected
BATTERY LOW	Battery is partly depleted, 5 shocks with 360 J each can still be triggered
CONNECT DEFIB ELECTRODES	no defibrillation electrode connector plugged into the device
ENERGY HIGH	The charged energy is higher than the chosen level; shock possible with the charged energy
ENERGY LOW	The charged energy didn't reach the chosen level; shock possible with the charged energy
LEADS FAIL/NO SYNC	ECG lead failure at monitor, synchronized defibrillation not possible
NO COMM/NO SYNC	No communication with monitor, synchronized defibrillation not possible
NO MONITOR/NO SYNC	monitor not ready, synchronized defibrillation not possible
TELEMETRY/NO SYNC	patient monitor receives ECG via telemetry; due to the long delay, this signal is not suitable for synchronization (Combo mode)

Pacemaker

Message	Explanation
APPLY ELECTRODES	excessive contact impedance at the defibrillation electrodes
PACER ACTIVE	user tries to turn off the defibrillator while pacemaker is still in operation
PACER ERROR	internal pacemaker problem
PADS REQUIRED	no pads are applied when pacemaker is turned on

Error Numbers

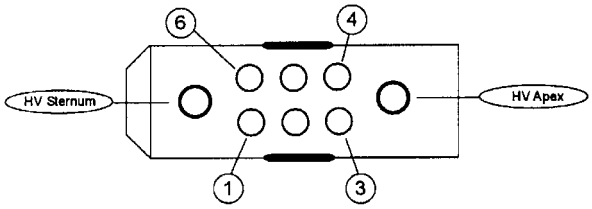
Error numbers displayed after device was switched on.

Error Number	Explanation
1	Unresolved exception in program
2	Internal RAM
3	External RAM
4	Keyboard; key pressed during device start
5	Bootloader Flash RAM
6	Program code Flash RAM
7	EEPROM
11	Failure of Internal Discharge; Caution: Risk of high voltage on HV-Capacitor
12	Failure of high voltage control (PIC problem)

9 Pin Configuration

External Connections

Paddle Input Connector



Front View

Paddle Connector					
Name	**Description**	**I/O-Type**	**Level**	**active**	**Pin Nr.**
PC4	Paddle coding	I	5V	L	1
GND	Ground	-	0V	-	2
PC6	Paddle coding	I	5V	L	3
HP_CHARGE	Charge key on external paddle	I	5V	L	4
HP_DISCHARGE	Discharge key on external paddle	I	5V	L	5
PC5	Paddle coding	I	5V	L	6
HV STERNUM	Shock_P	O	5000V	H	7
HV APEX	Shock_M	O	5000V	H	8

The following table shows the connections internal in the different paddle types that provide the coding of the type. Shown are the connections that exist between two pins in each case.

For example softpaddles are coded via a connection between pin PC/4 and PC/5. Internal electrodes without spoons are coded via a connection from PC/5 to PC/6 and a connection either directly or via resistor (4.75 kiloohms) from PC/4 to PC/5.

PC/3	PC/4	PC/5	PC/6	
				no paddles
	|_____|			Softpaddles 919 202 94/95 (223 383 01)
	|_(4k75)_|	|_____|		internal electrodes (without spoons) (217 308 01)
		|_____|		paddle pair for external defibrillation with operating keys (d)/(e) (217 333 01/02)
	|_____|			electrodes anterior/posterior (217 329 01)
|_____|	|_(4k75)_|			internal spoons with operating keys (not available yet)

Monitor Connector

Described in the following table are the signals that are used by the Dash Responder; additional signal on the "Dash Hardware Peripheral Expansion Interface", which are not used for the Dash Responder are shaded.

DASH MONITOR HARDWARE INTERFACE					
Name	**Description**	**I/O-Type**	**Level**	**active**	**Pin Nr.**
GND	Ground	-	0V	-	1
+9TO18VM *Switched +9-18V*	Power Supply from Monitor	I	+9...18V	-	2
PER_MARKER_OUT	Sync pulse to Defibrillator	I	TTL	H	3
PER_ENET_PRESENT*	By this signal the Monitor switches the Ethernet lines of the docking station.	O	0V	L	4
PER_ENET_TXD-	switched Ethernet Transmit line -	I	TTL	-	5
PER_ENET_RXD-	switched Ethernet Receive line -	O	TTL	-	6
PER_ENET_TXD+	switched Ethernet Transmit line +	I	TTL	-	7
PER_ENET_RXD+	switched Ethernet Receive line +	O	TTL	-	8
PER_AUTOPORT_ID_RXD	Autoport ID receive	O	TTL	-	9
PER_PRESENT_ *PER_PRESENT**	This outport must be switched to GND, then the monitor switches the power supply to the defib	O	TTL	L	10
PER_ASYNC_RXD	Asynchronous communication transmit to Monitor (Idle State is HI, Startbit is LOW)	O	TTL	L	11
PER_ASYNC_TXD	Asynchronous communication transmit to defib (Idle State is HI, Startbit is LOW)	I	TTL	L	12
PACER_BLANK_ *TC_PACER_BLANK**	Signal tells the monitor that an pacemaker pulse was delivered.	O	TTL	L	13
PER_AUTOPORT_ID_TXD	Autoport ID transmit	I	TTL	-	14
PER_AUTOPORT_RXD	Receive data from peripheral	O	TTL	-	15
PER_AUTOPORT_TXD	Transmit data to peripheral	I	TTL	-	16
SWITCHED +5V	power supply from Monitor	I	+5V	-	17
GND	Ground	-	0V	-	18

Battery Connector

BATTERY HARDWARE INTERFACE					
Name	**Description**	**I/O-Type**	**Level**	**active**	**Pin Nr.**
+12VBAT	Supply Voltage from Nickel Cadmium Battery Pack	-	+12Vnom	-	1, 2, 3
BAT_CONN_	Battery-Pack present (Connection to GND)	I	OC	L	7
BQ_DQ	Data/Control bus from Battery-Pack	I/O	TTL	L	5
BATT_EMPTY	Battery-Pack empty (FET to GND is switched on, as long as the Battery voltage is greater than 10 V)	I	OC	H	4
GND	Ground	-	0V	-	8, 9, 10

Internal Connections

Digital PCB

Analog PCB

Connector Name DEFI/

Interface PCB Analog to PCB Digital / Connector DEFI					
Name	**Description**	**I/O**	**Level**	**Active**	**Pin**
VCC	Supply Voltage	-	+5V	-	1
GND	Ground	-	0V	-	2
SDA	I²C- Datasignal	I/O	TTL	-	3
GND	Ground	-	0V	-	4
SCL	I²C-Clocksignal	I/O	TTL	-	5
GND	Ground	-	0V	-	6
KB_CHARGE	Keyboard key line CHARGE	O	TTL	H	7
GND	Ground	-	0V	-	8
KB_DISCHARGE	Keyboard key line SHOCK	O	TTL	H	9
GND	Ground	-	0V	-	10
HP_CHARGE	Hardpaddle key line CHARGE	I	TTL	H	11
GND	Ground	-	0V	-	12
HP_DISCHARGE	Hardpaddle key line SHOCK	I	TTL	H	13
GND	Ground	-	0V	-	14
EN_ SHOCKA	Enable Defishock to PIC_A	O	TTL	H	15

Interface PCB Analog to PCB Digital / Connector DEFI					
Name	**Description**	**I/O**	**Level**	**Active**	**Pin**
GND	Ground	-	0V	-	16
EN_SHOCKB	Enable Defishock to PIC_B	O	TTL	H	17
(code)	n. c.				18
A_DATA	Request line from PIC_A	I	TTL	H	19
GND	Ground	-	0V	-	20
B_DATA	Request line from PIC_B	I	TTL	H	21
GND	Ground	-	0V	-	22
DEFI_RESET	Reset	O	TTL	H	23
GND	Ground	-	0V	-	24
SPEAKER1	Speaker line 1	-	-	-	25
SPEAKER2	Speaker line 2	-	-	-	26

Display Interface

Connector Name DISPLAY/

Interface Display to PCB Digital					
Name	**Description**	**I/O**	**Level**	**active**	**Pin**
GND	Ground	-	0V	-	1
VCC	Power supply for Logic Circuit	-	+5V	-	2
V0	Power supply for LCD	-	+1V to –5V	-	3
ADR0	L=Instruction, H=Data	I	TTL	H	4
CS_DISPL1_	Chip Select1	I	TTL	L	5
CS_DISPL2_	Chip Select2	I	TTL	L	6
DISPL_EN	Display Enable	I	TTL	H	7
PWM_DISPCLK	External Clock (2kHz)	I	TTL	-	8
R/W_	Read/Write_	I	TTL	H/L	9
IO_DAT0	Data Bus0	I/O	TTL	-	10
IO_DAT1	Data Bus1	I/O	TTL	-	11
IO_DAT2	Data Bus2	I/O	TTL	-	12
IO_DAT3	Data Bus3	I/O	TTL	-	13
IO_DAT4	Data Bus4	I/O	TTL	-	14
IO_DAT5	Data Bus5	I/O	TTL	-	15

Interface Display to PCB Digital					
Name	**Description**	**I/O**	**Level**	**active**	**Pin**
IO_DAT6	Data Bus6	I/O	TTL	-	16
IO_DAT7	Data Bus7	I/O	TTL	-	17
CPLD_RESET_	Reset	I	TTL	L	18
VLED1	Power supply for LED Anode	-	+5V	-	19
VLED2	Power supply for LED Cathode	-	0 to +5V	-	20

Keypad Interface

Connector Name KEYPAD/

Interface Keypad to PCB Digital					
Name	**Description**	**I/O**	**Level**	**Active**	**PIN-Nr.**
KB_SEL0_	Matrix-Send line 0	O	TTL	L	10
KB_SEL1_	Matrix-Send line 1	O	TTL	L	9
KBSEL2_	Matrix-Send line 2	O	TTL	L	15
KBSEL3_	Matrix-Send line 3 (not used)	O	TTL	L	13
KB_IN0_	Matrix-Receive line 0	I	TTL	L	12
KB_IN1_	Matrix- Receive line 1	I	TTL	L	8
KB_IN2_	Matrix- Receive line 2	I	TTL	L	11
KB_IN3_	Matrix- Receive line 3	I	TTL	L	14
KB_POWER_ON_	Key POWER ON	I	CMOS +18V	L	19
KB_CHARGE_UB	Key CHARGE	I	+5V	H	3
KB_DISCHARGE1_UB	Key SHOCK1	I	+5V	H	7
POWER_ON_LED		O	+5V	H	20
BATT_GN_LED	Green LED is illuminated if Battery full (LED connected to GND)	O	+5V	H	1
BATT_YE_LED	Yellow LED is illuminated when Battery is being charged, it blinks yellow when battery charging function is defect or disturbed (LED is connected to GND)	O	+5V	H	2

Interface Keypad to PCB Digital					
Name	**Description**	**I/O**	**Level**	**Active**	**PIN-Nr.**
SYNC_LED_	LED is illuminated in Sync Mode and blinks during each Sync pulse	O	+5V	L	16
CHARGED_LED_	LED is illuminated when selected energy has been charged	O	+5V	L	17
PACER_ON_LED_	LED is illuminated when Pacer Mode active and blinks on each delivered pace pulse	O	+5V	L	5
KB_DISCHARGE2_UB	Key SHOCK2	O	+5V	H	6
VCC	Supply Voltage	-	+5V		4
GND	Ground	-	0V		18

Pacer PCB

Connector name PACER/

Interface PCB Pacer to PCB Digital					
Name	**Description**	**I/O**	**Level**	**Active**	**Pin**
VCCP	switched power supply from Dash 2000/3000/4000 for voltage generation of pace pulse	-	+9...18V	-	1
GNDP	Ground for VCCP	-	0V	-	2
VCCP	switched power supply from Dash 2000/3000/4000 for voltage generation of pace pulse	-	+9...18V	-	3
GNDP	Ground for VCCP	-	0V	-	4
VCC	power supply	-	+5V	-	5
GND	Ground for VCC	-	0V	-	6
PHASE_A_	clock for HV-Generator	I	H/L	L	7
GND	Ground for VCC	-	0V	-	8
PHASE_B_	clock for HV-Generator	I	H/L	L	9
GND	Ground for VCC	-	0V	-	10

Interface PCB Pacer to PCB Digital					
Name	**Description**	**I/O**	**Level**	**Active**	**Pin**
PACE_RESET_	Pacer- Reset	I	H/L	L	11
GND	Ground for VCC	-	0V	-	12
PACE_ACKN_	Pace-pulse- acknowledge	O	H/L	L	13
GND	Ground for VCC	-	0V	-	14
PACE_TXD	UART Send line	O	H/L	H	15
GND	Ground for VCC	-	0V	-	16
PACE_RXD	UART Receive line	I	H/L	H	17
GND	Ground for VCC	-	0V	-	18
PACE_IMP	Pace-pulse	I	H/L	H	19
GND	Ground for VCC	-	0V	-	18

Power Management

Connector Name BATTMAN/

Interface PCB Battery Management to PCB Digital					
Name	**Description**	**I/O**	**Level**	**Active**	**Pin**
BATT_GN_LED	Charging Status- LED. Green LED is solid on, when battery is charged.	I	+5V	H	1
BATT_YE_LED	ChargingStatus- LED. Yellow LED is solid on, when battery (NiCd) is being charged. If the yellow LED blinks the battery charging is erroneous.			H	2
GND	Ground	-	0V	-	3
KB_POWER_ON_	Keypad Power On	O	18V-CMOS	L	4
GND	Ground	-	0V	-	5
POWER_ON_KEY	Level shifted Power On signal	I	TTL	H	6
GND	Ground	-	0V	-	7
POWER_OFF_	Supply switch controlled by the processor	O	TTL	L	8
GND	Ground	-	0V	-	9

Interface PCB Battery Management to PCB Digital					
Name	**Description**	**I/O**	**Level**	**Active**	**Pin**
BATTMAN_RESET	Reset Powermanagement	O	TTL	H	10
GND	Ground	-	0V	-	11
BATT_TXD	UART send line	O	TTL	-	12
GND	Ground	-	0V	-	13
BATT_RXD	UART receive line	I	TTL	-	14
GND	Ground	-	0V	-	15
SYNC_	Sync-Signal for Cardioversion	I	TTL	L	16
GND	Ground	-	0V	-	17
MARKER_	Marker out signal for Monitor	O	TTL	L	18
GND	Ground	-	0V	-	19
PACER_BLANK	Pace-inhibit signal for monitor (during reset and defib switched off: low). Inverted outside of the Device-Control	O	TTL	H	20
GND	Ground	-	0V	-	21
PER_ASYNC_TXD	Asynchronous communication transmit	I	TTL	-	22
GND	Ground	-	0V	-	23
PER_ASYNC_RXD	Asynchronous communication receive	O	TTL	-	24
GND	Ground	-	0V	-	25
VCC	Power supply +5V for PCB Power Management	-	+5V	-	26
GNDD	Ground for VCCD	-	0V	-	27
VCCD	unregulated Power Supply for PCB Digital	-	+8V...+18 V	-	28
GNDD	Ground for VCCD	-	0V	-	29
VCCD	unregulated Power Supply for PCB Digital	-	+8V...+18 V	-	30
GNDP	Ground for VCCP	-	0V	-	31
VCCP	unregulated Power Supply for PCB PACER	-	+8V...+18 V	-	32
GNDP	Ground for VCCP	-	0V	-	33

Interface PCB Battery Management to PCB Digital					
Name	**Description**	**I/O**	**Level**	**Active**	**Pin**
VCCP	unregulated Power Supply for PCB PACER	-	+8V...+18 V	-	34

Smart Media Card

Connector Name SMARTCARD/

Interface Smart Media Card to PCB Digital					
Name	**Description**	**I/O**	**Level**	**Active**	**Pin**
GND	Ground	-	0V	-	1
SMC_CLE	Command Latch Enable	I	TTL	H	2
SMC_ALE	Address Latch Enable	I	TTL	H	3
SMC_WE_	Write Enable	I	TTL	L	4
SMC_WP_	Write Protect	I	TTL	L	5
SMCDAT_0	Data, Command, Status Port	I/O	TTL	-	6
SMCDAT_1	Data, Command, Status Port	I/O	TTL	-	7
SMCDAT_2	Data, Command, Status Port	I/O	TTL	-	8
SMCDAT_3	Data, Command, Status Port	I/O	TTL	-	9
GND	Ground	-	0V	-	10
GND	Ground	-	0V	-	11
VCC	+3,3V Power supply	-	+3,3V	-	12
SMCDAT_4	Data, Command, Status Port	I/O	TTL	-	13
SMCDAT_5	Data, Command, Status Port	I/O	TTL	-	14
SMCDAT_6	Data, Command, Status Port	I/O	TTL	-	15
SMCDAT_7	Data, Command, Status Port	I/O	TTL	-	16
LVD	Low Voltage Detect				17
GND	Ground	-	0V	-	18
SMC_RB_	Ready/Busy_	O	TTL	H/L	19
SMC_RE_	Read Enable	I	TTL	L	20
SMC_CE_	Chip Enable	I	TTL	L	21
VCC	+3,3V power supply	-	+3,3V	-	22
GND	Ground	-	0V	-	23
SMC_ABSENT	Card Detect	O	TTL	H	24

Analog PCB

Digital PCB

Connector Name DEFI/

(see description *Analog PCB*, page 40)

HV Capacitor

Connector Name KO_P/ and KO_M/

Interface Analog PCB to HV Capacitor					
Name	**Description**	**I/O**	**Level** (measured versus GND)	**Active**	**Pin**
KO_P	High Voltage + (floating)	-	+2500V	-	(single)
KO_M	High Voltage - (floating)	-	-2500V	-	(single)

Pacer PCB

Connector Name PACE_P/ and PACE_M/

Interface Analog PCB to Pacer PCB					
Name	**Description**	**I/O**	**Level** (measured versus GND)	**Active**	**Pin**
PACE_P	High Voltage + (floating)	-	max +200V during pace (+2500V during shock)	-	(single)
PACE_M	High Voltage - (floating)	-	max -200V during pace (-2500V during shock)	-	(single)

Paddle Connector

High Voltage Connector

Connector Name SHOCK_P/ and SHOCK_M/

Interface Analog PCB to Paddle connector (HV)					
Name	**Description**	**I/O**	**Level** (measured versus GND)	**active**	**Pin**
SHOCK_P	High Voltage + (floating)	-	max +200V during pace (+2500V during shock)	-	(single)
SHOCK _M	High Voltage – (floating)	-	max -200V during pace (-2500V during shock)	-	(single)

Paddle codes connector

Connector Name PC/

Interface Analog PCB to Paddle Connector (codes)					
Name	**Description**	**I/O**	**Level**	**Active**	**Pin**
HP_Charge	Charge key from Paddle	I	5V	L	1
HP_Discharge	Discharge key from Paddle	I	5V	L	2
Paddle4	Paddle code 4	I	5V	L	3
Paddle6	Paddle code 6	I	5V	L	4
GND	Ground	-	0V	-	5
MISC	Paddle code misc	I	5V	L	6
n.c.					7
n.c.					8

Power Management

Connector Name BAT1/

Interface Analog PCB to Power Management PCB					
Name	**Description**	**I/O**	**Level**	**Active**	**Pin**
+12V, +12VPWR	High current power supply	-	12V	-	1
+12V, +12VPWR	High current power supply	-	12V	-	2
GNDPWR	High current power supply	-	0V	-	3
GNDPWR	High current power supply	-	0V	-	4

Speaker

Connector Name SPEAK1/

Interface Analog PCB to Power Management PCB					
Name	**Description**	**I/O**	**Level**	**Active**	**Pin**
Speak1	Speaker line 1	O	-	-	1
n.c.		-	-	-	2
Speak2	Speaker line 2	O	-	-	3

Power Management PCB

Analog PCB

Connector Name BAT1/

(see description *Power Management*, page 49)

Digital PCB

Connector name DEFI/

(see description *Analog PCB*, page 49)

Pacer PCB

Analog PCB

Connector name PACE_P and PACE_M

(see description *Pacer PCB*, page 47)

Digital PCB

Connector name PACER/

(see description *Pacer PCB*, page 47)

10 Technical Specification

Operating Modes

non-synchronized (defibrillation on demand)

synchronized (cardioversion)

Energy Selection

by preselection, energy to be delivered into 50 Ohms is indicated as a numerical value:

- energy adjustable in steps, energy values as energy delivered into 50 Ohms (internal defibrillation: energy limited to 50 Joules)

2
5
7
10
20
30
50
100
150
200
300
360 Joules
Autosequence

- possible deviation from selected energy less than permitted by IEC and AAMI DF-2

Defibrillator Charging

via capacitor, capacitor charging from battery

- capacitor charging time for energy setting of 360 J: typically 10 s

Defibrillation Shock

capacitor discharge via induction coil (Lown / Edmark); exponential pulse shape, monophase, damped sinusoidal halfwave:

- pulse duration for external resistance of 50 Ohms approx. 2.6 ms in compliance with AAMI DF-2

Discharge Circuit

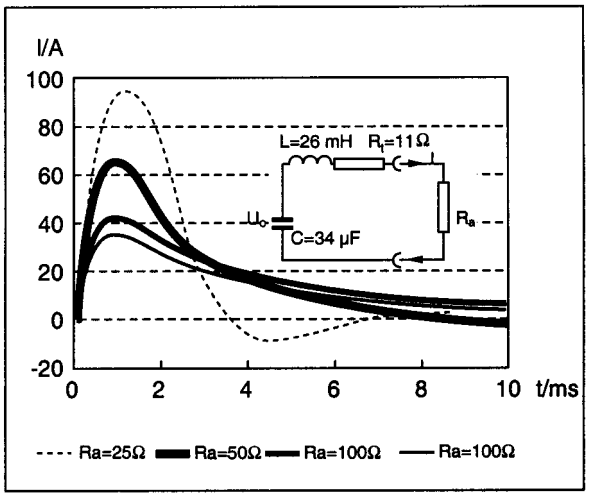


Figure 11-1. Current discharge curve (360 J)

serial oscillating circuit in series with external resistance (patient):

- capacitance 34 µF
- inductance 26 mH
- equivalent resistance 11 Ohms

Defibrillation Pulse Output

isolated, no conductive connection with enclosure, open-circuit and short-circuit-proof as required by AAMI DF-2:

- insulation test voltage 8 kV DC, type CF according to IEC 60601-2-4

Safety Discharge

capacitor discharge via internal load resistance:

- when the defibrillation shock is not triggered within 30 s of charging
- when the shock is triggered but the discharge circuit is interrupted, after approx. 0.2 s (e.g. when the shock is triggered into open air)
- when the battery is full and the selected energy cannot be reached within 20 seconds
- in the presence of technical malfunctions
- when the battery is removed
- when the device is switched off
- when the electrode connector is removed

Test Features

- 5 indicators (on battery) indicating the battery charge level
- defibrillator test by discharging the stored energy into the integrated 50-ohm load resistance (max. twice within 15 minutes)
- 3-digit display of the delivered energy
- warning on LCD when discharge circuit is interrupted (e.g. pacer electrode not applied)

- automatic power-on self-test with error message

Synchronization

with ECG signal of either polarity via monitor:

- indicated by yellow LED
- trigger marks on monitor display
- in synchronized mode delivery of defibrillation pulse delayed by 15 ms max. after trigger pulse from monitor (delay between R-wave and sync pulse: refer to operator's manual of patient monitor)

Pacemaker

- operating modes: Demand, Fix
- pacer rate: 30 to 200 ppm, adjustable in steps of 5 ppm, ± 1%
- pacer output: 0 to 200 mA ± 10% (0 to 500 Ohms), adjustable in steps of 5 mA
- pulse width: 20 ms, ± 0,5%
- pulse shape: monophase square-wave pulse
- recovery time of 50 ms after pulse delivery

Power Supply

from exchangeable NiCd battery

- rated voltage 12 V
- rated capacity 2.0 Ah
- battery charges either in the device or in the external charging unit ASU 3000 When charged in the device, power supply from connected Dash® 2000, Dash® 3000, or Dash® 4000 patient monitor:
  - charging voltage 9 to 18 V, DC voltage
  - charging current 320 mA to 490 mA
  - max. charge time of a depleted battery 6 hours
  - operating time per battery charge approx. 60 defibrillation shocks with 360 Joules each (into 50 Ohms)

Operational Readiness

- seconds, incl. automatic self-test

Operating Position

horizontal

Type of Protection

protected against penetration of spray water and small objects: IP 23 (battery inserted, cable connected)

Environment

Operation

- operation under the following conditions considered to be normal:

- temperature between 0 °C/32 °F and +50 °C/122 °F
- relative humidity between 5 % and 95 %, no condensation
- atmospheric pressure between 700 and 1060 hPa

Transport and Storage

temperature between –20 °C / –4 °F and +60 °C / 140 °F

relative humidity between 5% and 95%, no condensation

atmospheric pressure between 500 and 1060 hPa

Dimensions

- width 260 mm
- height 95 mm
- depth 250 mm

Weight

incl. battery: approx. 4.2 kg (battery weight approx. 1 kg)

Environmental Tests

- EMC requirements:
  CISPR 11, class B
- shock test:
  MIL-STD-810E 516.4 Procedure 1, ground equipment
- drop test:
  IEC 68-2-32
- vibration test:
  MIL 810E Cat. 10 and prEN 1789
- leakage current:
  insulation according to ANSI/AAMI ES 1

11 Maintenance and Technical Inspection

Schedule

To make sure the defibrillator remains in proper operational and functional order, a good maintenance schedule must be adhered to. The manufacturer's recommendations in this regard is as follows:

Inspection—Operators should perform this prior to admitting each patient to the defibrillator. Service personnel should perform this prior to servicing the defibrillator. As a general rule, the battery conditioning program should be run as part of the inspection (internal conditioning program or separate charging unit ASU 3000).

General cleaning—Operators should perform this prior to admitting each patient to the defibrillator. Service personnel should perform this after servicing the defibrillator.

Checkout Procedures—These should be performed by qualified service personnel upon receipt of the equipment, every year thereafter, and each time the defibrillator is serviced.

Leakage Current Tests—These should be performed by qualified service personnel upon receipt of the equipment, every year thereafter, and each time the defibrillator is serviced.

Calibration—Calibration of the shock energy measurement should be performed by qualified service personnel as soon as the yearly performed accuracy check showed deviation of the shock energy levels compared to those provided in the table on page 57. The calibration should also be performed whenever a circuit board is removed, repaired or replaced in the defibrillator. The calibration should also be performed if the software was updated.

Manufacturer Responsibility

Failure on the part of all responsible individuals, hospitals or the institutions, employing the use of this defibrillator, to implement the recommended maintenance schedule may cause equipment failure and potential operator and patient health hazards. The manufacturer does not in any manner, unless an Equipment Maintenance Agreement exists, assume the responsibility for performing the recommended maintenance schedule. The sole responsibility rests with all individuals, hospitals, or institutions utilizing the defibrillator.

Visual Inspection

Carefully inspect the defibrillator prior to each patient being admitted to the monitoring system. Follow theses guidelines when inspecting the equipment:

- Carefully inspect the defibrillator for obvious physical damage to the outer case, display screen and controls. **Do not** use the defibrillator if physical damage is evident. Refer damaged equipment to qualified service personnel for repair before using it again on a patient.
- Inspect all external connectors, top and rear, for degraded pins, prongs and connector housings. Refer damaged equipment to qualified service personnel for repair before using it again on a patient.
- Inspect all cable insulation, cable strain-reliefs and cable connectors for damage, cracks or degradation. Refer damaged equipment to qualified service personnel for repair before using it again on a patient.
- The defibrillator electrodes as well as handles must be free of any cream residues.
- Safety labels and inscriptions on the device are clearly legible.

General Cleaning

Clean external surfaces

The exterior surfaces may be cleaned with a lint-free cloth dampened with one of these approved solutions:

- ammonia (diluted),
- Cidex,
- mild soap (dissolved), or
- sodium hypochlorite bleach (diluted)

Recommendations

The manufacturer recommends the following guidelines to avoid damaging of the defibrillator:

Dilute all cleaning solutions according to respective manufacturer recommendations.

Use a clean, dry, lint-free cloth to wipe off excess cleaning solution after each application.

Do not pour water or cleaning solutions directly onto the device. Do not allow fluids to run into crevices or connectors on the defibrillator.

Never use these cleaning agents:

- abrasive cleaners or solvents of any kind,
- alcohol-based cleaning agents,
- wax containing a cleaning substance,
- acetone, or
- betadine

CAUTION

Follow these cleaning instructions exactly. Failure to follow the instructions may melt, distort, or dull the finish of the case, blur lettering on the labels, or cause equipment failures.

Checkout Procedures

The following pages contain the checkout procedures for the defibrillator. The purpose of the checkout procedures is to provide service personnel with a method which can be used to verify operational and functional performance of the monitor. Failure to attain any of the listed results indicates a potential malfunction of the defibrillator.

Perform the checkout procedures upon receipt of the defibrillator, every twelve month thereafter, and each time a circuit board is removed or replaced.

The checkout procedures are based on the assumption that the defibrillator being tested is used with known good cables and test equipment. It also requires that the user be somewhat familiar with the operation of all test equipment required for the checkout procedures. For more information concerning the operation of these components, refer to the respective operator manual.

Testing Equipment

The following table lists the manufacturer's recommended test equipment, adaptors, and cables necessary to successfully complete the checkout procedures. The checkout procedures were written for the test equipment in the following table. If test equipment other than the manufacturer's recommendation is used, it may be necessary to slightly modify some test steps.

Following Testing Equipment is required:

- Calibrated Defitester (e.g. DNI Nevada or equivalent)
- Safety Tester for measurements according to IEC601
- Pacer Testadapter (220 101 01)

- Service Tool (2006861-001)
- Oscilloscope
- Defi paddles (217 333 01)
- Internal Defi electrodes (217 308 01)
- Electrode Cable for soft paddles (223 383 01)

Performance test

Power up test

- Insert a charged battery.
- Switch on the device by pressing the ON-OFF key.
- All LEDs should shortly flash once. (BATTERY CHARGE LED may or may not flash)
- The indicator of the On-Off key is illuminated when the device is turned on.
- Observe the display whether any error messages are displayed. The messages that are displayed during a normal boot sequence are: SELFTEST ...; DASH RESPONDER (software version); COPYRIGHT GEMS IT year.
- After the boot sequence has been successfully performed the device starts up with a selected energy according to the settings for the autosequence mode.

Key Test

- Press both ENERGY SELECT keys simultaneously and then select SERVICE MODE, COMP TEST and KEY TEST.

Now press the following keys and verify the display entry:

Key	**Display**
CHARGE	Charge
SYNC	Sync
left ENERGY SELECT	Energy Select ∨
right ENERGY SELECT	Energy Select ∧
left SHOCK	Shock (left)
RIGHT SHOCK	Shock (right)
additional for Pacer Function	
LEFT RATE (PPM)	Rate ∨
RIGHT RATE (PPM)	Rate ∧
LEFT OUTPUT (MA)	Output ∨
RIGHT OUTPUT (MA)	Output ∧
PACER ON/OFF	Pacer On/Off
PACER MODE	Pacer Mode
PACER PAUSE	Pacer Pause

NOTE: For the test of the pacer keys press the keys at least 2 seconds.

Switch the Dash Responder off and on.

Display Test

- Press both ENERGY SELECT keys simultaneously and then select SERVICE MODE, COMP TEST and LCD TEST.
- A checkered pattern will appear.
- Verify that no pixels, rows or columns are missing.

Detection of internal Electrodes

- Connect the internal Defi Electrode (217 308 01) to the Dash Responder. Increase energy with ENERGY SELECT key.
- Check if the energy selection is limited to 50J.

Discharge and speaker test

The correct release of the defibrillation shock can be checked by means of a test discharge. For this test, the stored energy is discharged into the defitester.

- Connect the defib paddles (217 333 01) to the Dash Responder.
- Connect the adapter lead to the two contacts on the defitester.
- Using the ENERGY SELECT key select 50 J, 100 J and 360 Joules; check each value twice.
- Press the CHARGE KEY to initiate defibrillator charging (When using paddles, charging is initiated with the CHARGE/SHOCK key on the right paddle).
- When the defibrillator is charged, an intermittent audio signal sounds and the display shows the charged energy level on the second line.
- Now trigger the shock immediately. To do so, simultaneously press the two SHOCK keys. (When using paddles, simultaneously press the two keys on the paddles)
- After the shock release, the audio signal stops and the delivered energy is displayed for 5 seconds on the Dash Responder.
- According to the requirements of the IEC / AAMI standards, this value must be in the range as shown in the following table.

If the discharge circuit is interrupted (cable defect), a safety discharge will be initiated within 200 ms after the release of the shock. In this case ‘0J’ will be displayed as the delivered energy.

Accuracy of Shock Energy

Selected Energy	Energy Delivered (Dash Responder Display)	Energy Delivered (Defibtester)
2	0–4	0,5–3,5
5	3–7	3,5–6,5
7	5–9	5,5–8,5
10	8–12	8,5–11,5
20	18–22	18,5–21,5
30	27–33	27,8–32,3
50	45–55	46,3–53,8
100	90–110	92,5–107,5

Selected Energy	Energy Delivered (Dash Responder Display)	Energy Delivered (Defibtester)
150	135–165	138,8–161,3
200	180–220	185,0–215,0
300	270–330	277,5–322,5
360	324–396	333,0–387,0

If the energy that has been charged is not within the selected limits, a calibration according to the procedure found on page 20 has to be performed.

Pacemaker test

Pacemaker Test (With pacer testadapter)

The pacer testadapter (220 101 01) offers two possibilities for pacemaker testing, dependent of the setting of the switch on the testadapter:

1. Pacing pulse detecting via LED (switch in upper position).
2. Pacing pulse measurement with an oscilloscope (switch in lower position). The testadapter contains a resistor of 500 Ohms, that is wired between the connectors of the testadapter.

Do not actuate the Defib and Charge keys.

- Connect the pacer testadapter to the defib.
- Switch pacemaker on and select **operating mode FIX**.
- Select the oscilloscope position of the testadapter switch and connect the osci to the testadapter.
- Using the +mA; -mA key select any pulse amperage.
- Using the +P/min; -P/min key select any frequency.
- Using the oscilloscope measure the drop in voltage across the internal measuring resistor.

Adjust the following values on the Dash Responder and verify the values measured by the oscilloscope:

DASH-Responder setup		Values to measure		
mA	PPM	mA ± 10%	Pulsewidth in ms ± 5%	PPM ± 1%
0	60	-	-	-
5	60	5	20,0	60
50	120	50	20,0	120
150	120	150	20,0	120
200	120	200	20,0	120

- Calculate pulse amperage according to Ohm's Law I = U/R
  (Pulse amperage = measured voltage / measuring resistor 500 ohms).

Error message CHECK ELECTRODES appears when pulse current deviates from configured value (± 20% or ± 20 mA)

Defib Function Test and Pacer Option Test

The following tests are performed with the Service Tool (2006861-001). If the Dash Responder is connected with a Dash Monitor this tests could also be done by means of the Dash Monitor.

Tests performed with the Test Tool	**Tests performed with the Dash Monitor**
The below mentioned tests are performed when the Monitor Interface Test described on page 22 will be performed.	Set the Dash Monitor on top of the Dash Responder, connect the ECG Simulator to the Dash Monitor and power it up with AC, use a 5- or 12-Lead cable.
Defib Tests	Defib Tests
1. Periphery present test to Dash Monitor.	1. Periphery present test to Dash Monitor
2. Charging Status Test.	2. Charging Status Test If CHARGING LED lights yellow, both tests have passed.
3. Monitor Detection Test.	3. Monitor Detection Test
4. Communication test to Dash Monitor.	4. Communication Test to Dash Monitor
5. Synchronisation test for Signal from Dash Monitor.	5. Synchronisation Test for Signal from Dash Monitor Press SYNC key, if the SYNC LED on the Dash Responder lights yellow and will be switched off for short in the rhythm of the heart rate the 3 tests have passed.
6. Lead Fail/None Sync detection from Dash Monitor.	6. Lead Fail/None Sync detection from dash Monitor Disconnect the RL (N) Lead, the message LEADS FAIL/NO SYNC will appear on the Display of the Responder. The SYNC LED on the Responder turns off
Pacer Option Tests	Pacer Option Tests
7. Pacer on/off test.	7. Pacer on/off test Switch pacer function on, and check, that the yellow PACER ON/OFF LED is on, and the corresponding display frame for Pacer will be displayed.
8. Pacer blank signal to Dash Monitor tested.	8. Pacer blank signal to Dash Monitor tested. Set output to 5mA. Set pacer Mode so, that display shows FIX and check that the Dash Monitor shows a ‘P’ and a blinking ‘*’ on its display.
9. Detection of Telemetry ECG.	9. Detection of Telemetry ECG. No special test needed, if item 6 has been performed successfully.

Battery conditioning test

On Dash Responder, switch Pacer- and SYNC- mode off.

Press both ENERGY SELECT keys simultaneously, select SERVICE MODE / BATT COND.

Check that F/NEW value is not below 60%. If it is below 60% exchange the battery.

Start conditioning and check that green CHARGING STATUS LED is blinking.

While the battery is being charged, the yellow CHARGING STATUS LED is solid illuminated, it is off during discharging the battery and it is blinking if there is a charging problem.

12 Electrical Safety Tests

Electrical safety tests provide a method of determining if potential electrical health hazards to the patient or operator of the device exist.

To help you establish a systematic maintenance routine, GE Medical Systems recommends that you perform all safety tests presented in this chapter

- upon receipt of the device,
- every twelve months thereafter,
- each time the main enclosure is disassembled or a circuit board is removed, tested, repaired, or replaced

---

CAUTION

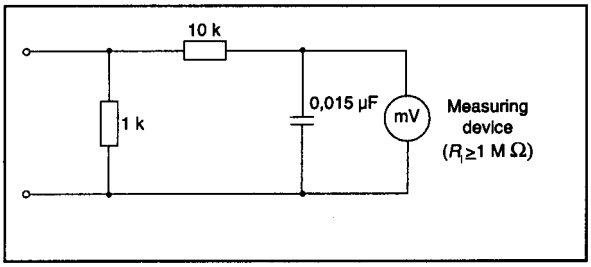
Failure to implement a satisfactory maintenance schedule may cause undue equipment failure and possible health hazards. Unless you have an Equipment Maintenance Contract, GE Medical Systems does not in any manner assume the responsibility for performing the recommended maintenance procedures. The sole responsibility rests with the individual or institution using the equipment. GE Medical Systems service personnel may, at their discretion, follow the procedures provided in this manual as a guide during visits to the equipment site.

Test Conditions

Electrical safety tests may be performed under normal ambient conditions of temperature, humidity, and pressure.

Test Equipment

- Safety Tester for measurements according to IEC 601.
- Testing connector according to the following picture.
- Measuring Device



NOTES

The MD (measuring device) is the circuitry defined by the appropriate standard for measuring leakage current.

The measuring devices, defined by various standard organizations (IEC, UL, etc.), produce almost identical test measurement results.

Patient (Sink) Leakage Current Test

(Mains Voltage on the Applied Part)

This procedure only applies to Class I (grounded/earthed) equipment, and measures the leakage current from a mains voltage source into each of the paddles.

The measurement should be made with a patient monitor connected to the defibrillator. Only in cases where the defibrillator is used stand-alone the measurement can be performed with a service tool box connected to the defibrillator. In this case the leakage current has to be measured at the ground plug of the service box. Disconnect the service tool box from all other connections (e.g. PC, power supply etc.).

WARNING

The following step will cause high voltage (120 VAC to 240 VAC) to appear at the PATN JACK on the leakage tester. Do not touch the PATN JACK posts or paddle lead clips during this test as an electrical shock will occur.

Referring to the electrical diagram, measurements have to be done under the following conditions:

- Polarity switch NORM and RVS
- GND switch GND closed
- If the Service Tool box is used, the GND plug of the service tools box has to be connected to the GND plug on the leakage tester

1. Read leakage current indicated on DMM.

If the reading is greater than the appropriate specification below, the device under test fails this test and should be repaired and tested again.

- 100 µA (0.05 volts on the DMM) at 120 – 240 VAC with external paddle electrodes.
- 50 µA (0.05 volts on the DMM) at 120 – 240 VAC with internal paddle electrodes.

NOTE

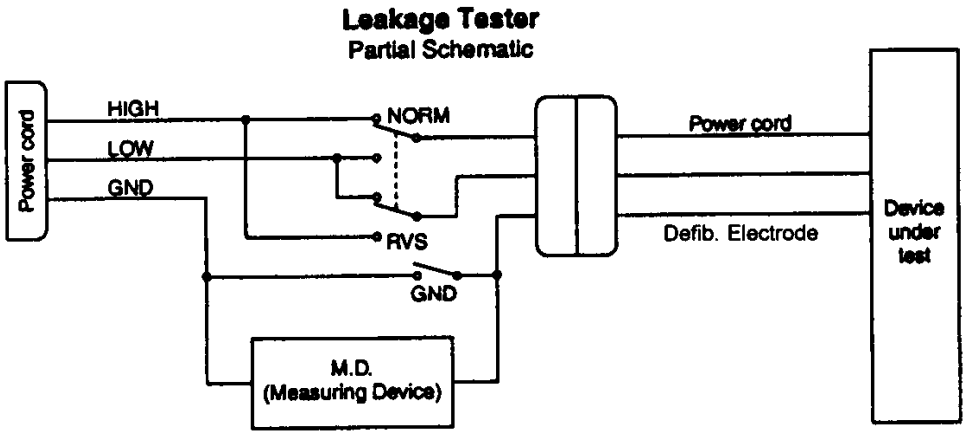
The 50 µA limit is according to ANSI/AAMI DF2. The leakage current is measured from each paddle.

2. Change the leakage tester polarity switch to the RVS position.
3. Read the leakage current indicated on the DMM. If the reading is greater than the appropriate specification below, the device under test fails this test and should be repaired and tested again.
   - 100 µA (0.05 volts on the DMM) at 120 – 240 VAC with external paddle electrodes.
   - 50 µA (0.05 volts on the DMM) at 120 – 240 VAC with internal paddle electrodes.

NOTE

The 50 µA limit is according to ANSI/AAMI DF2. The leakage current is measured from each paddle.

4. Set the power switch on the leakage tester to OFF.



13 Spare Parts List

Device

Part Description	*Detailed Part Description*	*Part No.*
Spare Pcb. Analog	Spare Pcb. Analog including 2 cable ties 7,5mm, 3 cable ties 2,5mm and 3 adhesive cable tie sockets (high pot tested).	2007050-001
Spare Pcb. Digital	Spare Pcb. Digital	2007311-001
Spare Ass. Power Management	Spare Assembly Power Management includes Pcb. Power Management and Battery Compartment	2007312-001
Spare Pcb. Pacer	Spare Pcb. Pacer (high pot tested)	2007313-001
LCD Display	LCD Display with backlight and connector	2003348-001
HV Capacitor	HV Capacitor 34uF 5.3kV, order 2 cable ties P/N 92309686 separately. Replaced by 2026979-001	90344988
HV Capacitor	HV Capacitor 35uF 5.2kV, order 2 cable ties P/N 92309686 separately. Needs SW version 1.01 or upwards.	2026979-001
Battery Pack	Battery Pack NiCD	2009219-001
Resistor Assembly	Resistor Assembly for testload	2003960-001

Mechanical Parts for Upper Case

Part Description	*Detailed Part Description*	*Part No.*
Upper Case	Upper Case, rubber gasket and labels have to be ordered separately	2001384-001
Rubber gasket	Rubber gasket for upper case, order length of 70cm	2004898-001
Rubber Gasket Battery Compartment	Rubber Gasket for Battery Compartment	2001793-001
Spare Locking Handle	Spare Locking Handle including Lever Arm, Handle and Spring Leg	2007051-001
Flat Washer	Flat Washer for holding Locking Handle	2001814-001
Stop Part	Plastic Yoke for directing Locking Handle	2003414-001
Slide	Plastic Slide for front or back	2001787-001
Spring Leg	Spring Leg (metal spring) for plastic slide	2006843-001
Bracket	Metal Bracket on top side.	2001788-001

Part Description	*Detailed Part Description*	*Part No.*
Label (Quick Reference Guide)	Label (Quick Reference Guide) English	2004424-001
Label (Quick Reference Guide)	Label (Quick Reference Guide) German	2004425-001
Label (Quick Reference Guide)	Label (Quick Reference Guide) French	2004426-001
Label (Quick Reference Guide)	Label (Quick Reference Guide) Italian	2004427-001
Label (Quick Reference Guide)	Label (Quick Reference Guide) Spanish	2004428-001
Label (Quick Reference Guide)	Label (Quick Reference Guide) Swedish	2004429-001
Label (Quick Reference Guide)	Label (Quick Reference Guide) Dutch	2004430-001
Label (Battery Key)	Label Battery Key (beside battery release knob)	2005470-001
Label (Dash2000, 3000, 4000 only)	Label (Dash 2000, 3000, 4000 only)	2005468-001
Frame Part	Frame (internal) to hold connector to Dash	2002139-001

Mechanical Parts for Lower Case:

Part Description	*Detailed Part Description*	*Part No.*
Lower Case	Lower Case, rubber feet, washer insulation and labels have to be ordered separately.	2001530-001
Pad White	Pad White (Rubber Foot) for Lower Case (4 are needed)	2005050-001
Label	Label (Defib/ Pacer Electrodes)	2005057-001
Label	Label (Battery Type) German	2005065-001
Label	Label (Battery Type) English	2005066-001
Label	Label (Battery Type) French	2005067-001
Label	Label (Battery Type) Italian	2005068-001
Label	Label (Battery Type) Spanish	2005069-001
Label	Label (Battery Type) Dutch	2005070-001
Label	Label (Battery Type) Swedish	2005071-001
Plate Mount GCX	Mounting Plate for GCX mounting	420001-001

Cover for Speaker	Plastic Cover for Speaker	2001528-001
Bracket MTG Capacitor	Bracket for mounting the Capacitor (2 are needed)	2001556-001
Cable Tie	Cable Tie for fixing the HV Capacitor (7,5 x 360)	92309686
Washer Insulation	Washer Insulation for Test Pins	2006374-001
Control Pin	Control Pin (Test Pins) on backside	2001554-001
O-Ring	O-Ring for Control Pin	92309604
Cover for speaker	Plastic cover for speaker	2001528-001

Mechanical Parts for Front Case

Part Description	*Detailed Part Description*	*Part No.*
Front Case	Assembly Front Case with Filter Pane, rubber gasket and Front Label have to be ordered separately	2007052-001
Rubber Gasket	Rubber Gasket for Front Case, order 70cm of length	2004898-001
Label	Label for Dash Responder without Pacer English	2003287-001
Label	Label for Dash Responder without Pacer German	2003288-001
Label	Label for Dash Responder without Pacer French	2003289-001
Label	Label for Dash Responder without Pacer Spanish	2003290-001
Label	Label for Dash Responder without Pacer Swedish	2003291-001
Label	Label for Dash Responder without Pacer Italian	2003292-001
Label	Label for Dash Responder without Pacer Dutch	2003293-001
Label	Label for Dash Responder with Pacer English	2003294-001
Label	Label for Dash Responder with Pacer German	2003295-001
Label	Label for Dash Responder with Pacer French	2003296-001
Label	Label for Dash Responder with Pacer Spanish	2003297-001
Label	Label for Dash Responder with Pacer Swedish	2003298-001
Label	Label for Dash Responder with Pacer Italian	2003299-001
Label	Label for Dash Responder with Pacer Dutch	2003300-001
Assy Keypad manual	Keypad for Dash Responder without Pacer	2005681-001

Part Description	*Detailed Part Description*	*Part No.*
Assy Keypad manual w Pacer	Keypad for Dash Responder with Pacer	2005681-003

Connectors and Cable Assemblies

Part Description	*Detailed Part Description*	*Part No.*
Assy Connector	Connector Assembly to connect Dash Responder to Dash Monitor	2004703-001
Connector RCPT Electrodes	Connector Defib Electrodes with cable Assembly	2003413-001
Cable Ass. Pcb. Pacer	Cable Assembly from Pcb. Analog to Pcb. Pacer, 1 cable tie 92308100 is needed separately.	2002548-001
Cable Ass. Capacitor	Cable Assembly from Pcb. Analog to Capacitor, 2 cable ties 92308100 and 2 cable ties 92309686 are needed separately.	2002549-001

Miscellaneous

Part Description	*Detailed Part Description*	*Part No.*
Insulation Part	Insulation backside of HV capacitor	2004866-001
Insulation Foil	Insulation foil HV capacitor	2004865-001
Plastic Insulation	Plastic Insulation connectorside of HV capacitor	2001527-001
ASU 3000	Charging Unit ASU 3000 for NiCd batteries (external)	70127901

Tools

Part Description	*Detailed Part Description*	*Part No.*
Kit Service Tool	Service Tool Kit for Dash 2000 and Dash Responder, including Power supply 2000300-001, DRST Box 2005378, Software Disks 2006862-001, Connection Cable 2233603.	2006861-001
Kit Upgrade Dash Responder	Dash Responder Software V1. Kit is replaced by 2007647-003 Software V1.01.	2007647-001
Kit Upgrade Dash Responder	Dash Responder Software V1.01. For download of this software, the Service Tool Kit 2006861-001 is needed.	2007647-003

Operator Manual

Part Description	*Detailed Part Description*	*Part No.*
Operator Manual V1	Operator Manual Version 1 German	2002853-001
Operator Manual V1	Operator Manual Version 1 English	2002853-002
Operator Manual V1	Operator Manual Version 1 French	2002853-003
Operator Manual V1	Operator Manual Version 1 Italian	2002853-004
Operator Manual V1	Operator Manual Version 1 Spanish	2002853-005
Operator Manual V1	Operator Manual Version 1 Dutch	2002853-006
Operator Manual V1	Operator Manual Version 1 Swedish	2002853-007

14 Master Record Index (see Appendix)

15 Circuit Diagrams (see Appendix)

Diese Tabelle definiert die gültigen Konfigurationen des Dash Responder Version V1.0, SW V1.01
This table defines the valid configurations of the Dash Responder Version V1.0, SW V1.01

Komponente Component		Sach-Nr. Part No.	Index (Prod.)	Referenz Reference	kompatibel compatible (Service)	in Variante in variant
Analog	pcb analog dash-add-on-defi	2002316-001	C		B	001/002
	Ersatzteil Nr. Spare part No.	2007050-001				
Digital	pcb digital dash-add-on-defi	2000923-001	F		D, E	001/002
	Ersatzteil Nr. Spare part No.	2007311-001				
Power-management	pcb power-management dash-add-on-defi	2002440-001	B		A	001/002
	Ersatzteil Nr. Spare part No.	2007312-001				
Keypad	pcb keypad dash-add-on-defi	2001158-001	B		A	001/002
Connector	pcb connector dash-add-on-defi	2002436-001	A			001/002
Pacer	pcb pacer dash-add-on-defi	2001198-001	D		C	002
	Ersatzteil Nr. Spare part No.	2007313-001				
	Software Code Dash Responder	2004445-002	A			001/002
	Speaker spkr assy	2003415-001	A			001/002
	Display DSPL LCD 122x32	2003348-001	C			001/002
	High voltage capacitor	903 449 88				001/002
	34µF	V1.0 and V1.01 Software, until Dash Responder Index F				
	35µF	V1.01 Software required, until Dash Responder Index F				
	High voltage capacitor	2026979-001				001/002
	35µF	V1.01 Software required, as of Dash Responder Index G				

Änd.Index Revision	kommt vor numbers	ECO No.	Änderungsbeschreibung - Change Description	Datum - Date	Name
h	--	080788	Version no. changed, Capacitor 2026979-001 added	19.05.2005	G.Krieg
g	--	075307	pcb keypad von "A" auf "B"	19.11.2003	B.Deimel
f	--	067925	pcb digital von "e" auf "f", SW geändert in 2004445-002	12.09.01	G.Krieg
e	--	067648	pcb analog von "B" auf "C"	22.08.01	G.Krieg
d	--	066505	pcb power-management auf "B", Spare part No. hinzu	04.07.01	G.Krieg
c	--	066001	Index pcb digital auf "e", pcb pacer auf "d" geändert	06.06.01	G.Krieg

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Werkstoff - Material

Rohteil

Freimaßtoleranz - Tolerance

File Name: 2002550-013_SZ02

Dokument Bezeichnung - Document Description: doc schem SZ02

Dokument Nr. - Document No.: 2002550-013

Projektion | Format: A4 | Maßstab - Scale | Oberfläche - Finish

	Datum - Date	Name
Entworfen-Drawn	29.06.00	G.Krieg
Geprüft-Approved	14.12.00	H.Schlosser
Geprüft-Approved		

Zeichn.Art/Blatt Nr.: SZ/02

Teil Bezeichnung - Part Description: MRI "Dash Responder"

Teil Nr. - Part Number: 2002550-001/002

1	2	3	4

The differences to the first version 1.0 are described in the MRI. The approved revision status of software and/or hardware updates can be taken from the currently valid MRI (Part No. or Index). Depending on manufacture, within any one version there may be several valid revision statuses, listet in the column "compatible with".

Explanation of hardware updates:

pcb analog	2002316-001	B	Initial Release
		C	Reduced noise of HV-measurement
pcb digital	2000923-001	D	Initial Release
		E	- Elimination of wire-wraps to layout - Change of filter network between XFC- and VDDSYN- pin Z2 because of recommendation of Motorola
		F	- EMI improvement
pcb power-mgnt	2002440-001	A	Initial Release (Software V1.0 and V1.01)
		B	- Elimination of wire-wraps to layout - PER_ASYNC_RXD/TXD Interface inactive without monitor (white screen Dash3000) Software V1.01 required - Power up only if battery voltage is sufficient
pcb keypad	2001158-001	A	Initial Release
		B	Change of LED's
pcb connector	2002436-001	A	Initial Release
pcb pacer	2001198-001	C	Initial Release
		D	- Placement of diode D7 into layout - Removement of connector PACE_P/ 4mm to the top and 3mm on the right - Replacment of pacer transformer TR500 from old 2002200-001 to new 6kV-typ 2004685-001 than 5 solder pins 916 189 03 are unnecessary

Software Version 1.01

Änd.Index Revision	kommt vor numbers	ECO No.	Änderungsbeschreibung - Change Description	Datum - Date	Name
g	--	075307	pcb keypad Index "B" hinzu	19.11.2003	B.Deimel
f	--	067925	pcb digital Index "f" hinzu	12.09.01	G.Krieg
e	--	067648	pcb analog Index "C" hinzu	22.08.01	G.Krieg
d	--	066505	englischer Text hinzu	04.07.01	G.Krieg
c	--	066001	pcd digital auf Index "e", pcb pacer auf Index "d"	06.06.01	G.Krieg
b	--	066513	Initial Release 1.Lot	23.03.01	G.Krieg
a	--	--	neu	14.12.00	G.Krieg

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Werkstoff - Material

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Freimaßtoleranz - Tolerance

File Name: 2002550-014_SZ03

Dokument Bezeichnung - Document Description: doc schem SZ03

Dokument Nr. - Document No.: 2002550-014

Projektion | Format: A4 | Maßstab - Scale | Oberfläche - Finish

	Datum - Date	Name
Entworfen-Drawn	13.12.00	G.Krieg
Geprüft-Approved	14.12.00	H.Schlosser
Geprüft-Approved		

Zeichn.Art/Blatt Nr.: SZ/03

Teil Bezeichnung - Part Description: MRI "Dash Responder"

Teil Nr. - Part Number: 2002550-001/002

nur in 2002550-002

ASSY CONNECTOR
2004703-001

PCB CONNECTOR DASH-ADD-ON-DEFI
2002436-001

PCB POWER-MANAGEMENT DASH-ADD-ON-DEFI
2002440-001

MON/

BA/

BA/

BATTMAN/

PCB PACER DASH-ADD-ON-DEFI
2001198-001

PACER_M

PACER_P

PACE_P/

PACE_M/

PACER/

CABLE ASSY PCB PACER
2002548-001

CONN RCPT ELECTRODES
2003413-001

CAP 35µF +/-5% 5.2kV
2026979-001

KO/-

KO/+

CABLE ASSY DASH RESPONDER
2002549-001

SHOCK_ M/

SHOCK_ P/

PC/

PACER_M

PACER_P

SHOCK_M/

PACE_M/

SHOCK_P/

PACE_P/

KO_P/

KO_M/

KO_M/

KO_P/

SPEAK/

BAT1/

DEFI/

PCB ANALOG DASH-ADD-ON-DEFI
2002316-001

SPEAK/

SPKR ASSY
2003415-001

PCB KEYPAD DASH-ADD-ON-DEFI
2001158-001

DSPL LCD 122x32
2003348-001

PCB DIGITAL DASH-ADD-ON-DEFI
2000923-001

nur in 2002550-002

c	1x	080788	Capacitor lt. no. changed from 90344988 to 2026979-001	19.05.2005	G.Krieg
b	--	068164	Darstellung berichtigt, Kabelbinder entfallen	12.10.01	G.Krieg
a	-	-	neu	14.12.00	G.Kaltenbach
Änd.Index Revision	Anzahl vor Numbers	ECO No.	Änderungsbeschreibung - Change Description	Datum - Date	Name

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Werkstoff - Material

Rohteil

Freimaßtoleranz - Tolerance

Projektion

Format: A1

Maßstab - Scale

Oberfläche - Finish

	Datum - Date	Name
Entworfen-Drawn	28.06.00	G.Kaltenbach
Geprüft-Approved	20.09.00	H.Schlosser
Geprüft-Approved		

File Name: 2002550-006_SZ01

Dokument Bezeichnung - Document Description: doc schem SZ01

Dokument Nr. - Document No.: 2002550-006

Zeichn.Art/Blatt Nr.: SZ/01

Teil Bezeichnung - Part Description: Dash Responder

Teil Nr. - Part Number: 2002550-001

nur in 2002550-002

CONN RCPT ELECTRODES
2003413-001

KO
90344988

KO/-

KO/+

CABLE ASSY DASH RESPONDER
2002549-001

SHOCK_ M/

SHOCK_ P/

PC/

PACER_M

PACER_P

PCB PACER DASH-ADD-ON-DEFI
2001198-001

CABLE ASSY PCB PACER
2002548-001

PACE_P/

PACE_M/

PACER/

ASSY CONNECTOR
2004703-001

PCB CONNECTOR DASH-ADD-ON-DEFI
2002436-001

PCB POWER-MANAGEMENT DASH-ADD-ON-DEFI
2002440-001

MON/

BA/

BA/

BATTMAN/

KO_P/

KO_M/

SPEAK/

BAT1/

DEFI/

PCB ANALOG DASH-ADD-ON-DEFI
2002316-001

SPEAK/

SPKR ASSY
2003415-001

PCB KEYPAD DASH-ADD-ON-DEFI
2001158-001

DSPL LCD 122x32
2003348-001

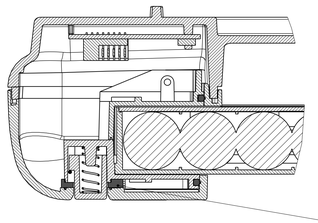
PCB DIGITAL DASH-ADD-ON-DEFI
2000923-001

nur in 2002550-002

GE Medical Systems IT GmbH Munzinger Str. 3 D-79111 Freiburg					
Werkstoff - Material					
Rohteil	b	--	068164	Darstellung berichtigt; Kabelbinder entfallen	12.10.01 G.Krieg
	a	-	-	neu	14.12.00 G.Kaltenbach
	Änd.Index Revision	Ausmaß vor Ausführung	ECO No.	Änderungsbeschreibung - Change Description	Datum - Date / Name
Freimaßtoleranz - Tolerance	Projektion		Format A1	Maßstab - Scale	Oberfläche - Finish
File Name: 2002550-006_SZ01					Entworfen-Drawn 28.06.00 G.Kaltenbach Geprüft-Approved 20.09.00 H.Schlosser Gepr.QS-Approved
Dokument Bezeichnung - Document Description: doc schem SZ01	Zeichn.Art/Blatt Nr.: SZ/01		Teil Bezeichnung - Part Description: Dash Responder		Teil Nr. - Part Number: 2002550-001
Dokument Nr. - Document No.: 2002550-006					

B-B
X
ohne handle dargestellt
shown without handle
Y
Z
2001384-001
scr f. plastic-3x8 countersunk 3x
(801 777 16)
2009219-001 d
2002193-001
scr DIN7985-M4x16 4x
(801 776 39)
2001530-001
scr DIN7985-M4x40 spez. 4x
(801 776 86)
2003855-001
2001793-001
923 096 86
2x
420001-001
scr f. plastic-4x10 panhead 4x
(2002374-004)
2005050-001
4x
E-E
2026979-001 e
A-A
2004898-001
in Nut eingelegt
put into groove
2003348-001
scr f. plastic-2,5x8 panhead 2x
(801 777 20)
D-D
2:1
2001386-001
2004703-001
in Nut mit Kleber abdichten
Dichtungskleber 3145 RTV
(829 073 00)
2002674-001
2001554-001
2x
wshr DIN6798-A4,3 2x
(804 083 00)
nut DIN934-M4 2x
(803 014 00)
C-C
2002139-001
scr f. plastic-3x16 panhead 2x
(2002374-002)
2000923-001
scr f. plastic-3x8 panhead 3x
(801 776 96)
923 096 04
2x
2003415-001
2001556-001
scr f. plastic-3x10 panhead 8x
(801 777 09)
2001527-001
2003960-001
Ansicht Z
ohne casing base und dazugehörende Teile dargestellt
shown without casing base and associated parts
927 230 35 label mit Cat.No. und Ser.No.
an dieser Stelle auf casing base 2001530 geklebt
siehe Pos.15 label catalog b
Ansicht Y
ohne casing cover und dazugehörende Teile dargestellt
shown without casing cover and associated parts
b
2004865-001
mit 927 230 35 label adh 2x
am Kondensator befestigt
2002765-001
X
2001813-001
E
2004866-001
2002440-001
scr f. plastic-3x6 panhead 2x
(801 777 25)
scr f. plastic-3x25 panhead 3x
(801 777 62)
2005468-001
B
B
2001788-001
scr f. plastic-3x8 countersunk 6x
(801 776 96)
nur in Variante 002 + 004
only in version 002 + 004
2005681-003
scr f. plastic-3x8 countersunk 9x
(801 777 16)
2001787-001
2x
2006843-001 b
2x gerader Federschenkel
in 2001787-001 eingelegt
D
D
E
nur in Variante 001 + 003
only in version 001 + 003
2005681-001
scr f. plastic-3x8 countersunk 9x
(801 777 16)
2003798-001
pin ISO2338-A-3x10-V2A
(805 027 00)
2001814-001
scr f. plastic-4x8 countersunk
(2002374-003)
2003414-001
scr f. plastic-3x8 countersunk 2x
(801 777 16)
A
A
923 096 69
3x
923 081 00
3x
2002316-001
scr f. plastic-3x8 panhead 5x
(801 776 96)
nur in Variante 02 + 04
only in version 02 + 04
2001198-001
scr f. plastic-3x8 panhead 2x
(801 776 96)
2002548-001
cable assy
2003929-001
cable flat
2003413-001
scr f. plastic-3x10 panhead 2x
(801 777 09)
923 096 82
2001528-001
scr f. plastic-3x10 panhead 3x
(801 777 09)
C
C
2005470-001
927 229 52 c
2005469-001
scr f. plastic-3x10 panhead 2x
(801 777 09)
hierzu/see
cable assy Dash Responder
2002549-001
2005057-001
b
2006374-001
GE Medical Systems IT GmbH
Munzinger Str. 3
D-79111 Freiburg
ProE Zeichnung
Copyright GE Medical Systems IT
Schutzvermerk nach DIN34 beachten
ZM/01
Dash Responder
2002550-001

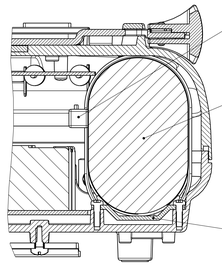
B-B



2001793-001

923 096 86
2x

E-E



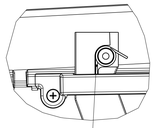
903 449 88

2004703-001
in Nut mit Kleber abdichten
Dichtungskleber 3145 RTV
(829 073 00)

2002139-001
scr f. plastic-3x16 panhead 2x
(2002374-002)

2001556-001
scr f. plastic-3x10 panhead 8x
(801 777 09)

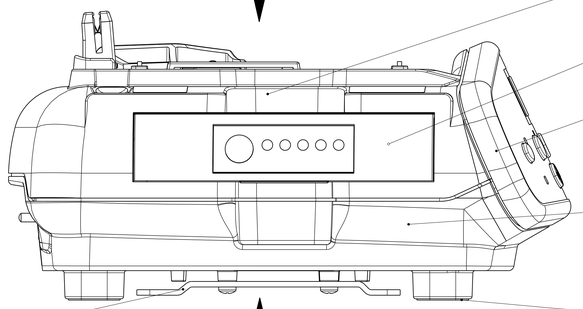
X
ohne handle dargestellt
shown without handle



2003855-001

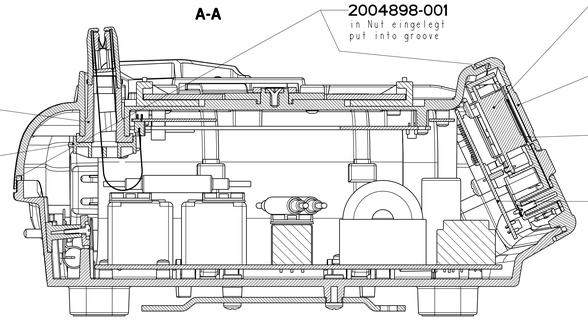
420001-001
scr f. plastic-4x10 panhead 4x
(2002374-004)

Y



Z

A-A



2004898-001
in Nut eingelegt
put into groove

2001384-001
scr f. plastic-3x8 countersunk 3x
(801 777 16)

2009219-001 (d)

2002193-001
scr DIN7985-M4x16 4x
(801 776 39)

2001530-001
scr DIN7985-M4x40 spez. 4x
(801 776 86)

2005050-001
4x

2003348-001
scr f. plastic-2,5x8 panhead 2x
(801 777 20)

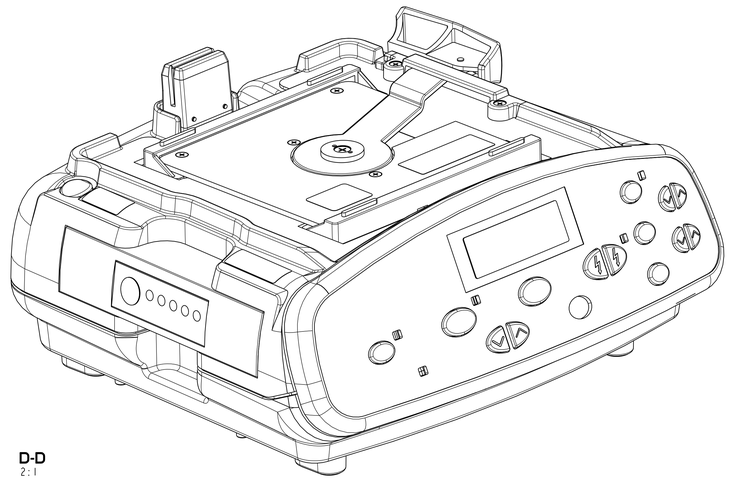
2001386-001

2002674-001

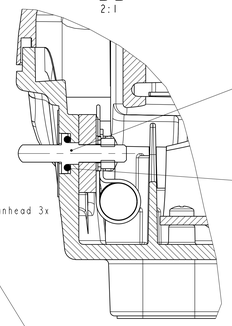
2000923-001
scr f. plastic-3x8 panhead 3x
(801 776 96)

2001527-001

2003960-001



D-D
2:1

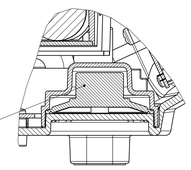


2001554-001
2x
wshr DIN6798-A4,3 2x
(804 083 00)
nut DIN934-M4 2x
(803 014 00)

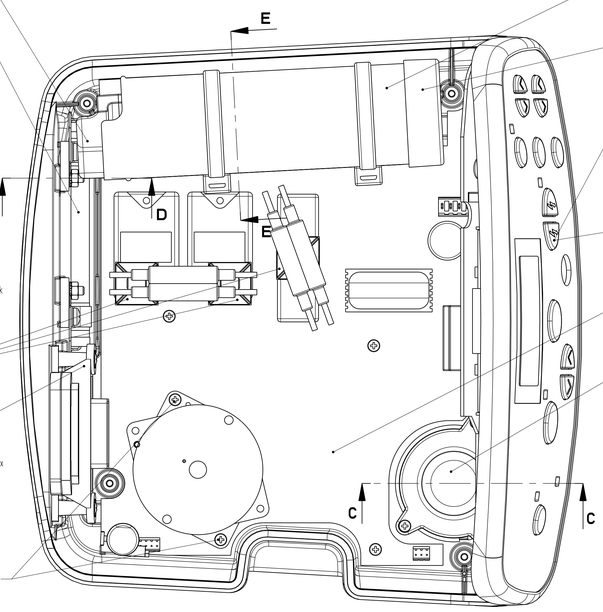
923 096 04
2x

2003415-001

C-C



Ansicht Y
ohne casing cover und dazugehörende Teile dargestellt
shown without casing cover and associated parts



(b)

2004865-001
mit 927 230 35 label adh 2x
am Kondensator befestigt

2004866-001

nur in Variante 002 + 004
only in version 002 + 004

2005681-003
scr f. plastic-3x8 countersunk 9x
(801 777 16)

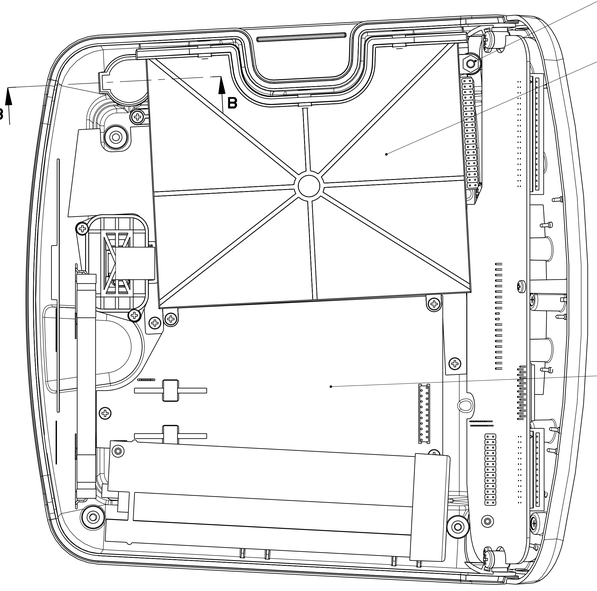
nur in Variante 001 + 003
only in version 001 + 003

2005681-001
scr f. plastic-3x8 countersunk 9x
(801 777 16)

2002316-001
scr f. plastic-3x8 panhead 5x
(801 776 96)

2001528-001
scr f. plastic-3x10 panhead 3x
(801 777 09)

Ansicht Z
ohne casing base und dazugehörende Teile dargestellt
shown without casing base and associated parts



2002765-001

2002440-001
scr f. plastic-3x6 panhead 2x
(801 777 25)
scr f. plastic-3x25 panhead 3x
(801 777 62)

2003798-001
pin ISO2338-A-3x10-V2A
(805 027 00)

2003414-001
scr f. plastic-3x8 countersunk 2x
(801 777 16)

nur in Variante 02 + 04
only in version 02 + 04

2001198-001
scr f. plastic-3x8 panhead 2x
(801 776 96)

2002548-001
cable assy

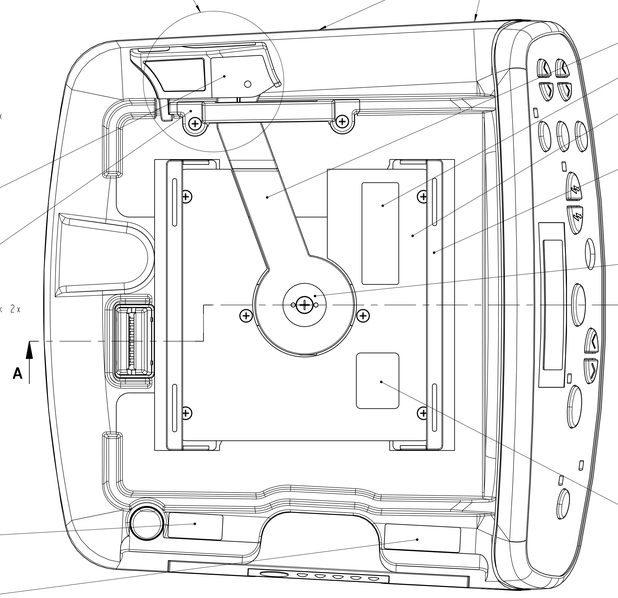
2003929-001
cable flat

2005470-001

2005469-001

927 230 35 label mit Cat.No. und Ser.No.
an dieser Stelle auf casing base 2001530 geklebt
siehe Pos.15 label catalog (b)

X



2001813-001

2005468-001

2001788-001
scr f. plastic-3x8 countersunk 6x
(801 776 96)

2001787-001
2x

(b)
2006843-001
2x gerader Federschenkel
in 2001787-001 eingelegt

2001814-001
scr f. plastic-4x8 countersunk
(2002374-003)

923 096 69
3x

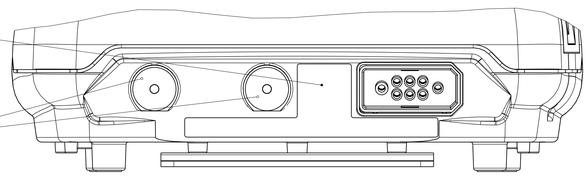
923 081 00
3x

2003413-001
scr f. plastic-3x10 panhead 2x
(801 777 09)

923 096 82

927 229 52 (c)

scr f. plastic-3x10 panhead 2x
(801 777 09)



(b)
2006374-001

2005057-001

hierzu/see
cable assy Dash Responder
2002549-001

Teilindex d Teilenderungsindex: 071608

d	1x	071608	Sach-Nr. geändert	18.02.2003	B.Steinel
c	1x	071521	Label 92722952 hinzu	27.07.2002	B.Steinel
b	4x	066980	2006374-001 und 2006843 hinzu	14.05.01	G.Krieg
a	---	---	neue Zeichnung	11.12.00	G.Krieg

GE Medical Systems IT GmbH
Mutzinger Str. 3
D-79111 Freiburg

Werkstoff - Material

Oberfläche - Finish

Toleranzklasse - Tolerance
ISO 2768 - mK

Änderungsbeschreibung - Change Description

ECO No.

Datum - Date | Name

Projektion - Projection | Format: A0 | Maßstab - Scale: 1:1 | Oberfläche - Finish: ---

Erstellt - Drawn: 20.06.00 L.Lendauer
Geprüft - Approved: 11.12.00 G.Krieg
Freigabe - Approved:

Zeichn.-Art/Blatt-Nr. - Drawing Type/Sheet No.: ZM/01

Teil-Bezeichnung - Part Description: Dash Responder

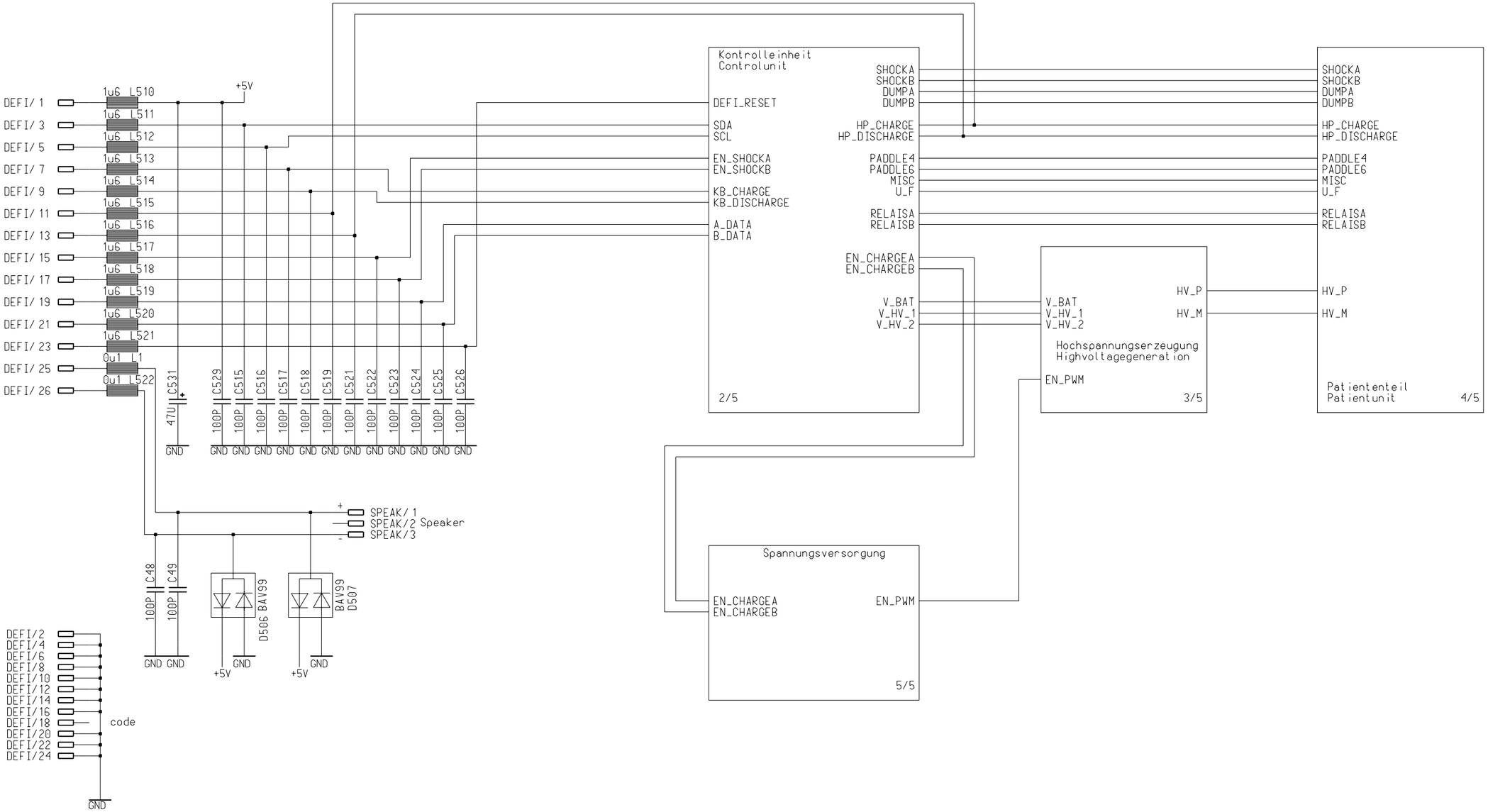
Teil-Nr. - Part Number: 2002550-001

Allgemeine Bezeichnung - General Description
doc mech Dwg ZM01

Dokument-Nr. - Document No.
4002550-005

Pro/E Name
2002550-005_ZM01

Prof. Zeichnung
Copyright GE Medical Systems IT
Schutzvermerk nach DIN34 beachten



Schutzvermerk nach DIN 34 beachten

Marquette Hellige GmbH D-79007 Freiburg							2002317-001	Sheet: 1 of 5
Not equipped in Version :		REVISIONS Revision-No	Index	Date / Name	A03	2002315-001		
x1	2002316-001	ER21920	1	20.01.00/VRP		Date / Name	SCHEMATIC	
x2		ER23599	2	17.07.00/VRP	DRAWN	16.12.1999/VRP		
x3		MR26708	A	30.10.00/VRP	APPROVED	23.12.1999/WHL	ANALOG DASH-ADD-ON-DEFI	
x4								
x5					ISSUED	V. PLACKE		

RESET-Filterung

+5V
R57 100R
R56 392R
T7
BC847B
DEFI_RESET
R55 4K99
R54 47K5
GND
GNDA
MAX821LUS-T
VCC RESET_
GND SRT
X2
C29 0U1
C21 0U1
R38 10K
R37 100R
5VPICB
C18 0U1
D13 BAV99
D12 BAV99
R45 4K99
PIC B
PIC16C72
VDD
VSS1
VSS2
MCLR
OSC1
OSC2
RA0
RA1
RA2
RA3
RA4
RA5
RB0 EN_SHOCKB
RB1 EN_CHARGEB
RB2 HP_DISCHARGE
RB3 KB_DISCHARGE
RB4 PADDLE4
RB5 PADDLE6
RB6 DUMPB
RB7 SHOCKB
RC0 U_F
RC1 MISC
RC2 SCL
RC3 SDA
RC4 B_DATA
RC5
RC6
RC7
R99 475R
R94 475R
R95 475R
R53 475R
R52 475R
R39 10K
R96 475R
4,000MHz
QU500
33R2 R516
C502 22P
C503 22P
GNDOB
V_HV_2
RELAISB
V_BAT
Analogsignale_PIC_B(3:1)
Z2
5VPICB
C24 0U1
+5V_AD_B
T8
BSS84
+7VR
R105 332K
R106 100K
T9
R103 4K99
47K5 R102
AD1585BRT
Vin Vout
GND
V3
C19 1U
C20 4U7
Spannungsreferenz
fuer AD-Wandler
Voltagereferencefor AD-Converter

RESET-Filterung

R83 10K
C34 0U1
R62 100R
PIC A
PIC16C72
D17 BAV99
D16 BAV99
R77 4K99
5VPICA
C45 0U1
EN_SHOCKA
EN_CHARGEA
HP_CHARGE
KB_CHARGE
DUMPA
SHOCKA
U_F
SCL
SDA
A_DATA
R104 475R
R101 10K
R107 10K
R71 475R
R70 475R
R64 10K
R65 10K
4,000MHz
QU501
33R2 R531
C514 22P
C520 22P
V_HV_1
RELAISA
V_BAT
Analogsignale_PIC_A(3:1)
Z4
5VPICA
C50 0U1
+5V_AD_A
AD1585BRT
V5
C46 1U
C47 4U7
Spannungsreferenz
fuer AD-Wandler
Voltagereferencefor AD-Converter

Schutzvermerk nach DIN 34 beachten

Marquette Hellige GmbH D-79007 Freiburg						2002317-002 Sheet: 2 of 5
Not equipped in Version :		REVISIONS			A03	2002315-001
		Revision-No	Index	Date / Name		Date / Name
x1	2002316-001	ER21920	1	20.01.00/VRP		
x2		ER23599	2	31.07.00/VRP	DRAWN	16.12.1999/VRP
x3		MR26708	A	30.10.00/VRP	APPROVED	23.12.1999/WHL
x4						
x5					ISSUED	V.PLACKE

SCHEMATIC
ANALOG DASH-ADD-ON-DEFI

$USER_CAE_B/daod_analog

Spannungsueberwachung
Voltagesupervision

stromgesteuerter, stromgeregelter Gegentaktwandler
currentfed, currentcontroled Push-Pull Converter

Hochspannungsmessung
Highvoltagemeasurement

Spannungsverdopplung
Voltagedoubler

Strommessung
Currentmeasurement

Hochspannungsmessung
Highvoltagemeasurement

Schutzvermerk nach DIN 34 beachten

Marquette Hellige GmbH D-79007 Freiburg						2002317-003 Sheet: 3 of 5
Not equipped in Version :		REVISIONS Revision-No	Index	Date / Name	A03	20002315-001
x1	2002316-001	ER21920	1	20.01.00/VRP		Date / Name
x2		ER23599	2	31.07.00/VRP	DRAWN	21.12.1999/VRP
x3		MR26708	A	30.10.00/VRP	APPROVED	23.12.1999/WHL
x4		ECO066497	B	28.01.01/VRP		
x5		ECO067648	C	13.08.01/VRP	ISSUED	V. PLACKE
						SCHEMATIC
						ANALOG DASH-ADD-ON-DEFI

$USER_CAE_B/daod_analog

Filterung der Paddlecodierung

Filter for Paddlecoding

Filterung der Paddleschalter

Filter for Paddleswitches

Paddleconnector

Filterung VCC fuer Paddles

Filter VCC

C-Relais

C-Relay

Einkopplung Pacer

Coupling for Pacer

Ueberwachung Spulenspannung

Supervision Coilvoltage

B-Relais

B-Relay

Ansteuerung C-Relais

C-Relay Driver

Relaisansteuerung fuer HV-Test

Relaiscontrol for HV-Test

Ansteuerung B-Relais

B-Relay Driver

Energiemessung

Energymeasurement

U/f-Wandler

U/f-Converter

Impulsformung

Pulseforming

Schutzvermerk nach DIN 34 beachten

Marquette Hellige GmbH D-79007 Freiburg						2002317-004
Not equipped in Version :		REVISIONS			A03	2002315-001
		Revision-No	Index	Date / Name		Date / Name
x1	2002316-001	ER21920	1	20.01.00/VRP		
x2		ER23599	2	31.07.00/VRP	DRAWN	23.12.1999/VRP
x3		MR26708	A	30.10.00/VRP	APPROVED	23.12.1999/WHL
x4						
x5					ISSUED	V. PLACKE

SCHEMATIC

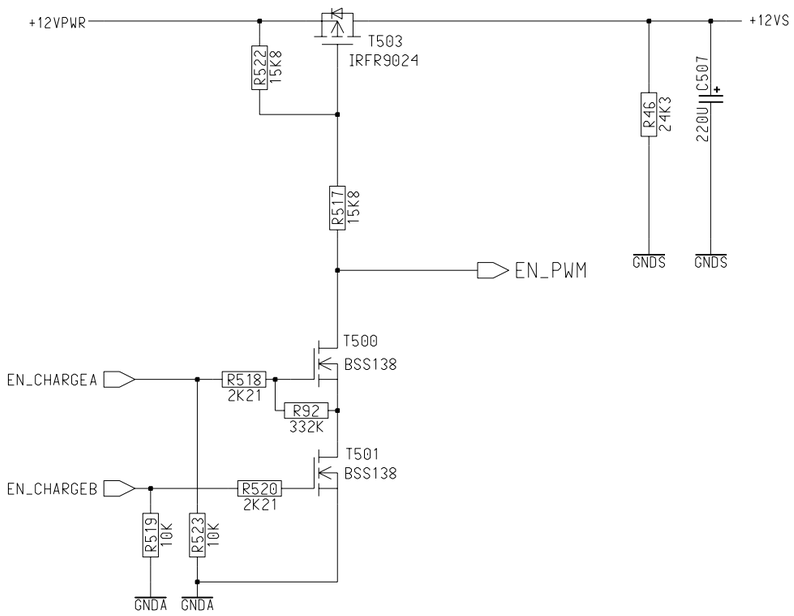
ANALOG DASH-ADD-ON-DEFI

Sheet: 4 of 5

$USER_CAE_B/daod_analog

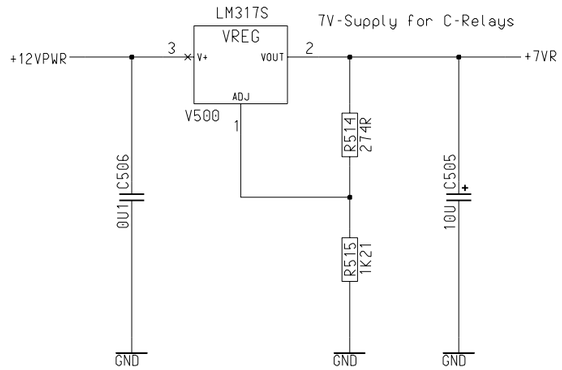
Freischaltung Versorgung fuer PWM-Schaltung

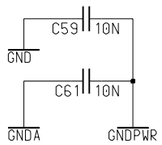
Powersupply Enable for PWM-Circuit

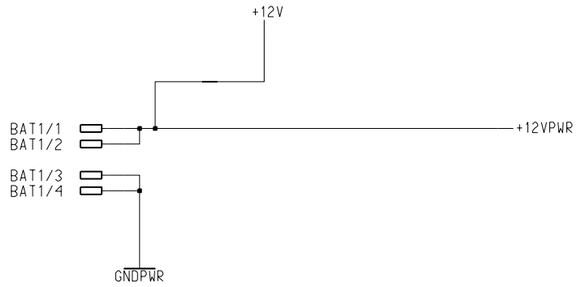


7V-Versorgung fuer C-Relais

7V-Supply for C-Relays

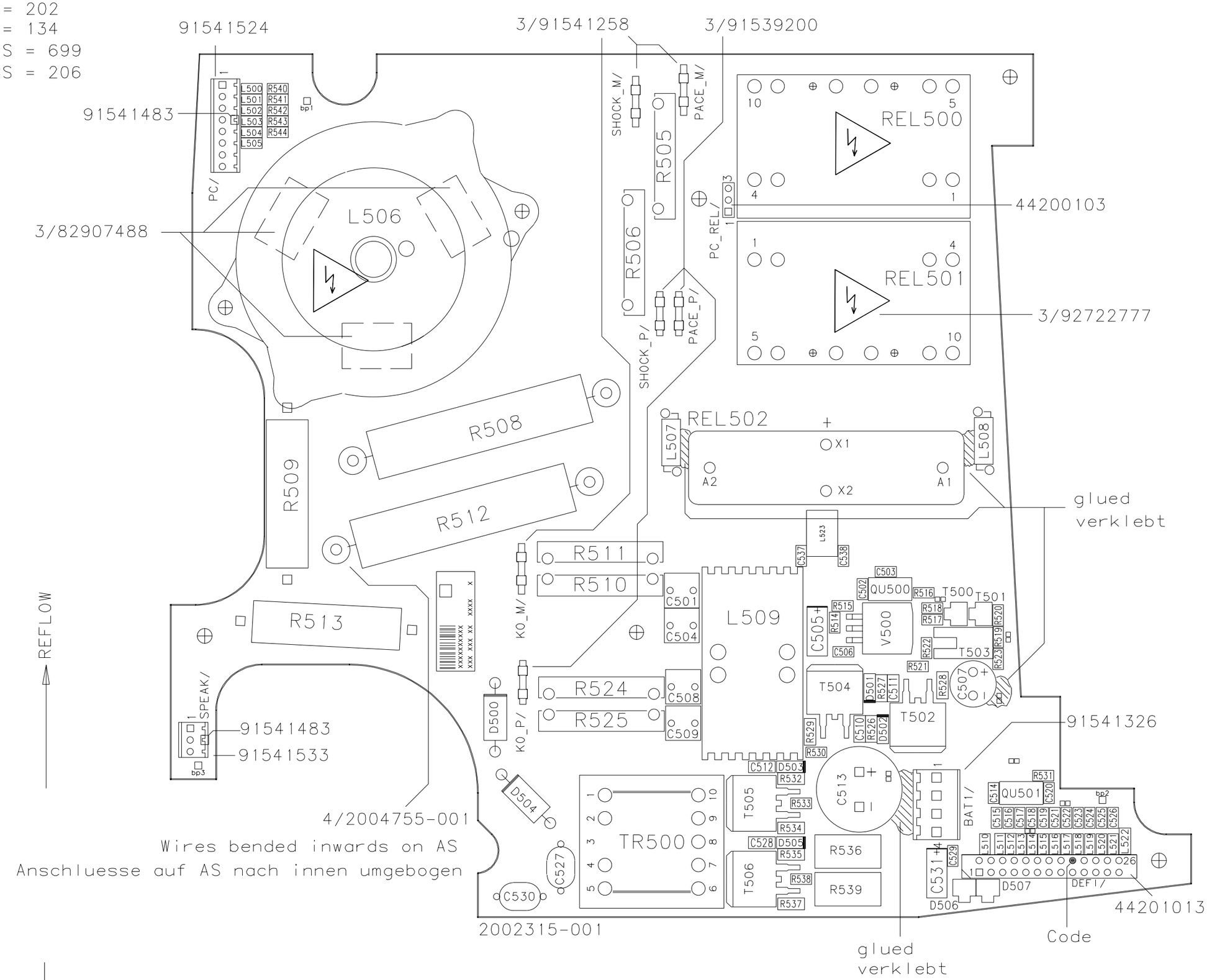






Marquette Hellige GmbH D-79007 Freiburg						2002317-005	Sheet: 5 of 5
Not equipped in Version :		REVISIONS Revision-No	Index	Date / Name	A03	2002315-001	
x1	2002316-001	ER21920	1	20.01.00/VRP		Date / Name	SCHEMATIC
x2		ER23599	2	21.07.00/VRP	DRAWN	21.12.1999/VRP	
x3		MR26708	A	30.10.00/VRP	APPROVED	23.12.1999/WHL	DASH-ADD-ON-DEFI ANALOG
x4							
x5					ISSUED	V. PLACKE	

BT-AS = 202
BT-BS = 134
LOET-AS = 699
LOET-BS = 206



Schutzvermerk nach DIN 34 beachten.

Marquette Hellige GmbH D-79007 Freiburg				2002316-002 1 / 2
REVISIONS				A03 2002315-001
Revision-No	Index	Date/Name		Date/Name
ER21920	1	12.01.00/MSG		
ER23599	2	01.08.00/MSG	Drawn	12.01.00/MSG
MR26708	A	30.10.00/MSG	Approved	12.01.00/VRP
			Issued	M. Gutmann

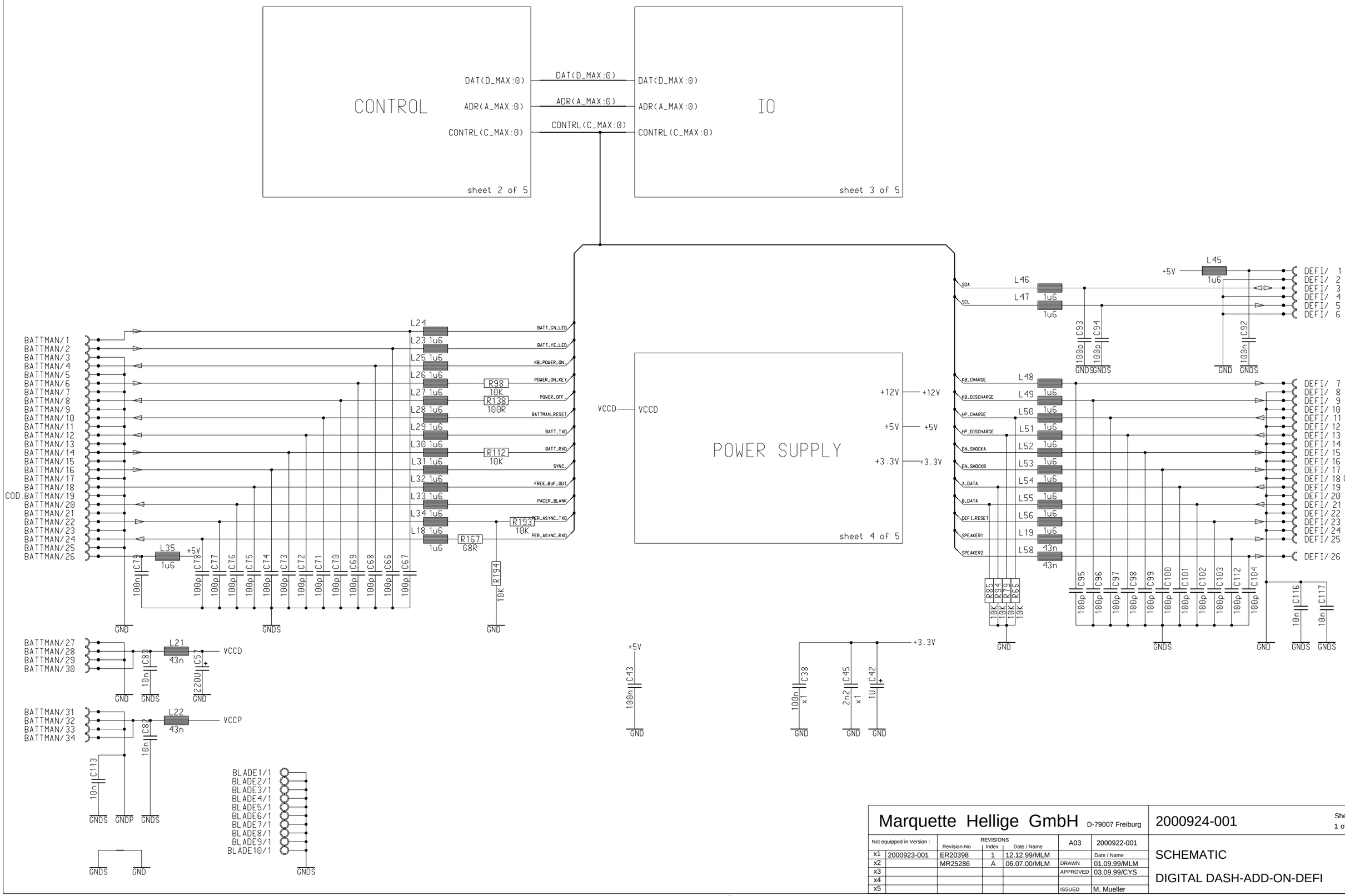
DOC REF DWG ANALOG DASH-ADD-ON-DEFI

BT-AS = 202
BT-BS = 134
LOET-AS = 699
LOET-BS = 206

Schutzvermerk nach DIN 34 beachten.

Marquette Hellige GmbH D-79007 Freiburg				2002316-003 2 /2
REVISIONS				A03
Revision-No	Index	Date/Name		2002315-001
ER21920	1	12.01.00/MSG		Date/Name
ER23599	2	01.08.00/MSG	Drawn	12.01.00/MSG
MR26708	A	13.11.00/MSG	Approved	12.01.00/VRP
065804	B	13.11.00/MSG		
			Issued	M. Gutmann

REF DWG ANALOG DASH-ADD-ON-DEF I



Schutzvermerk nach DIN 34 beachten

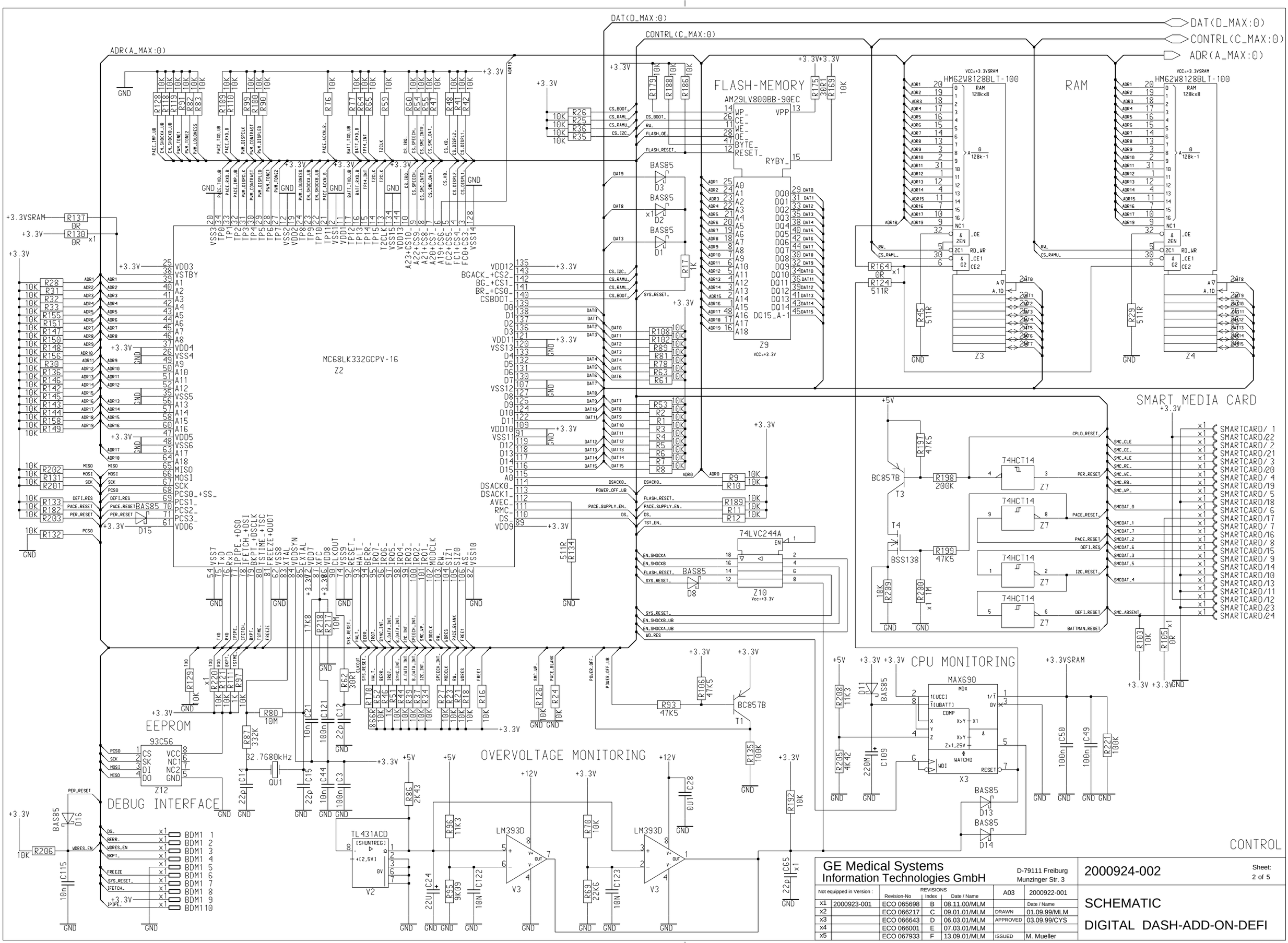
Marquette Hellige GmbH D-79007 Freiburg						2000924-001
Not equipped in Version :		REVISIONS Revision-No	Index	Date / Name	A03	2000922-001
x1	2000923-001	ER20398	1	12.12.99/MLM		Date / Name
x2		MR25286	A	06.07.00/MLM	DRAWN	01.09.99/MLM
x3					APPROVED	03.09.99/CYS
x4						
x5					ISSUED	M. Mueller

SCHEMATIC

DIGITAL DASH-ADD-ON-DEFI

Sheet: 1 of 5

Wednesday, December 30, 1998
$USER_CAE_A/dd_digital/design



Schutzvermerk nach DIN 34 beachten

GE Medical Systems Information Technologies GmbH					D-79111 Freiburg Munzinger Str. 3	2000924-002	Sheet: 2 of 5
Not equipped in Version :		REVISIONS				A03	2000922-001
		Revision-No	Index	Date / Name			Date / Name
x1	2000923-001	ECO 065698	B	08.11.00/MLM			
x2		ECO 066217	C	09.01.01/MLM	DRAWN	01.09.99/MLM	SCHEMATIC
x3		ECO 066643	D	06.03.01/MLM	APPROVED	03.09.99/CYS	
x4		ECO 066001	E	07.03.01/MLM			DIGITAL DASH-ADD-ON-DEFI
x5		ECO 067933	F	13.09.01/MLM	ISSUED	M. Mueller	

[1998, 12, 29, 3]
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ADR(A_MAX:0)
DAT(D_MAX:0)
CONTRL(C_MAX:0)
IO_DAT(I_MAX:0)

CPLD

sheet 5 of 5

AUDIO AMPLIFIER

POWER_SUPPLY -5V

BRIGHTNESS

CONTRAST

I2C-BUS-CONTROLLER

SOUND PLAYBACK

IO

Schutzvermerk nach DIN 34 beachten

GE Medical Systems Information Technologies GmbH	D-79111 Freiburg Munzinger Str. 3	2000924-003	Sheet: 3 of 5
		SCHEMATIC	
		DIGITAL DASH ADD-ON-DEFI	

Not equipped in Version :		REVISIONS Revision-No	Index	Date / Name		Date / Name
x1	2000923-001	ER20398	1	08.12.99/MLM	A03	2000922-001
x2		MR25286	A	06.07.00/MLM	DRAWN	01.09.99/MLM
x3		ECO 065698	B	08.11.00/MLM	APPROVED	03.09.99/CYS
x4		ECO 066001	C	30.11.00/MLM		
x5		ECO 067933	D	13.09.01/MLM	ISSUED	M. Mueller

[1999, 1, 13, 4]
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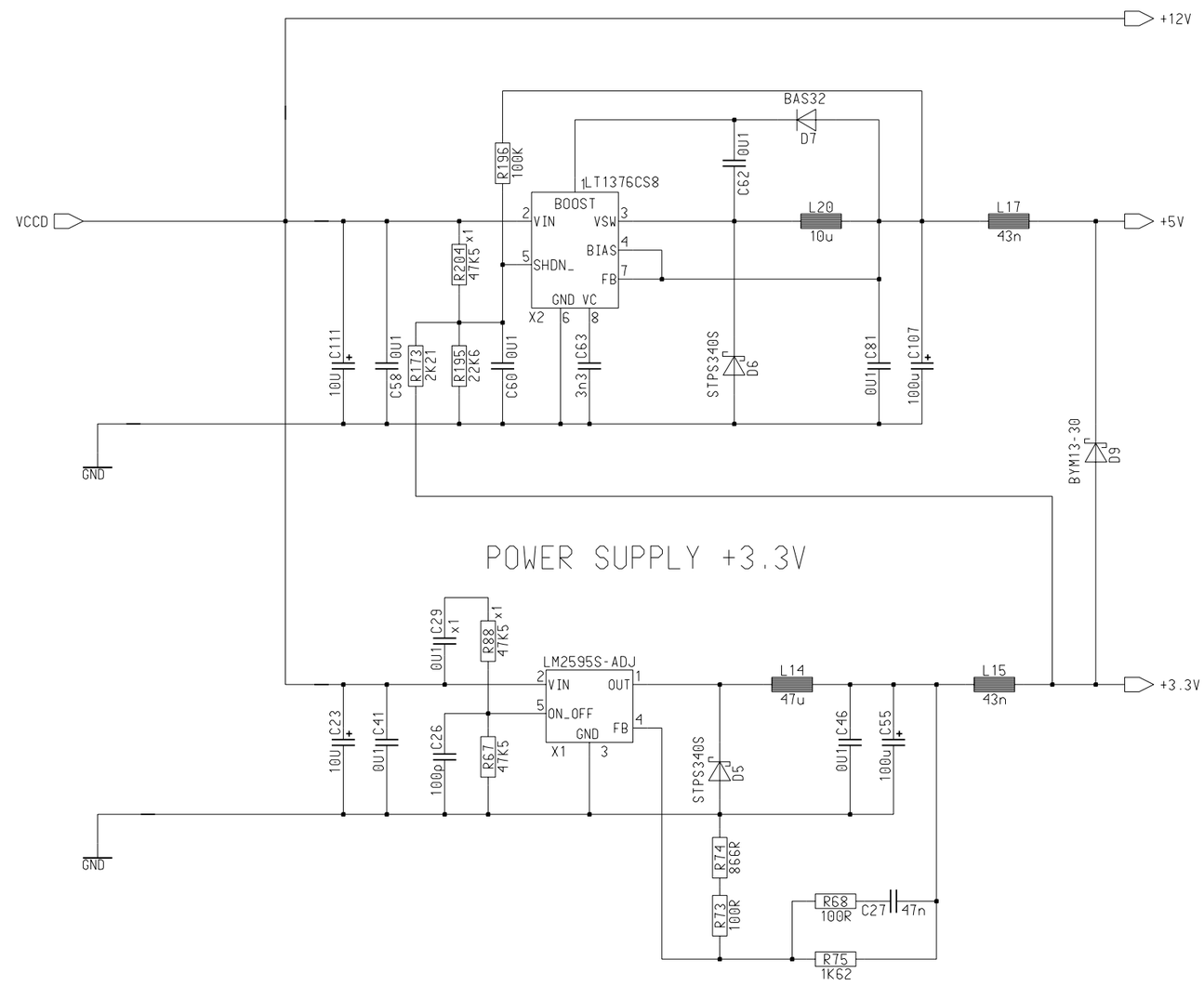
POWER SUPPLY +5V



POWER SUPPLY

Marquette Hellige GmbH D-79007 Freiburg						2000924-004 Sheet: 4 of 5
Not equipped in Version :		REVISIONS Revision-No	Index	Date / Name	A03	2000922-001
x1	2000923-001	ER20398	1	03.12.99/MLM		Date / Name
x2		MR25286	A	06.07.00/MLM	DRAWN	01.09.99/MLM
x3					APPROVED	03.09.99/CYS
x4						
x5					ISSUED	M. Mueller

SCHEMATIC

DIGITAL DASH-ADD-ON-DEFI

Schutzvermerk nach DIN 34 beachten

[1999, 9, 6, 2]
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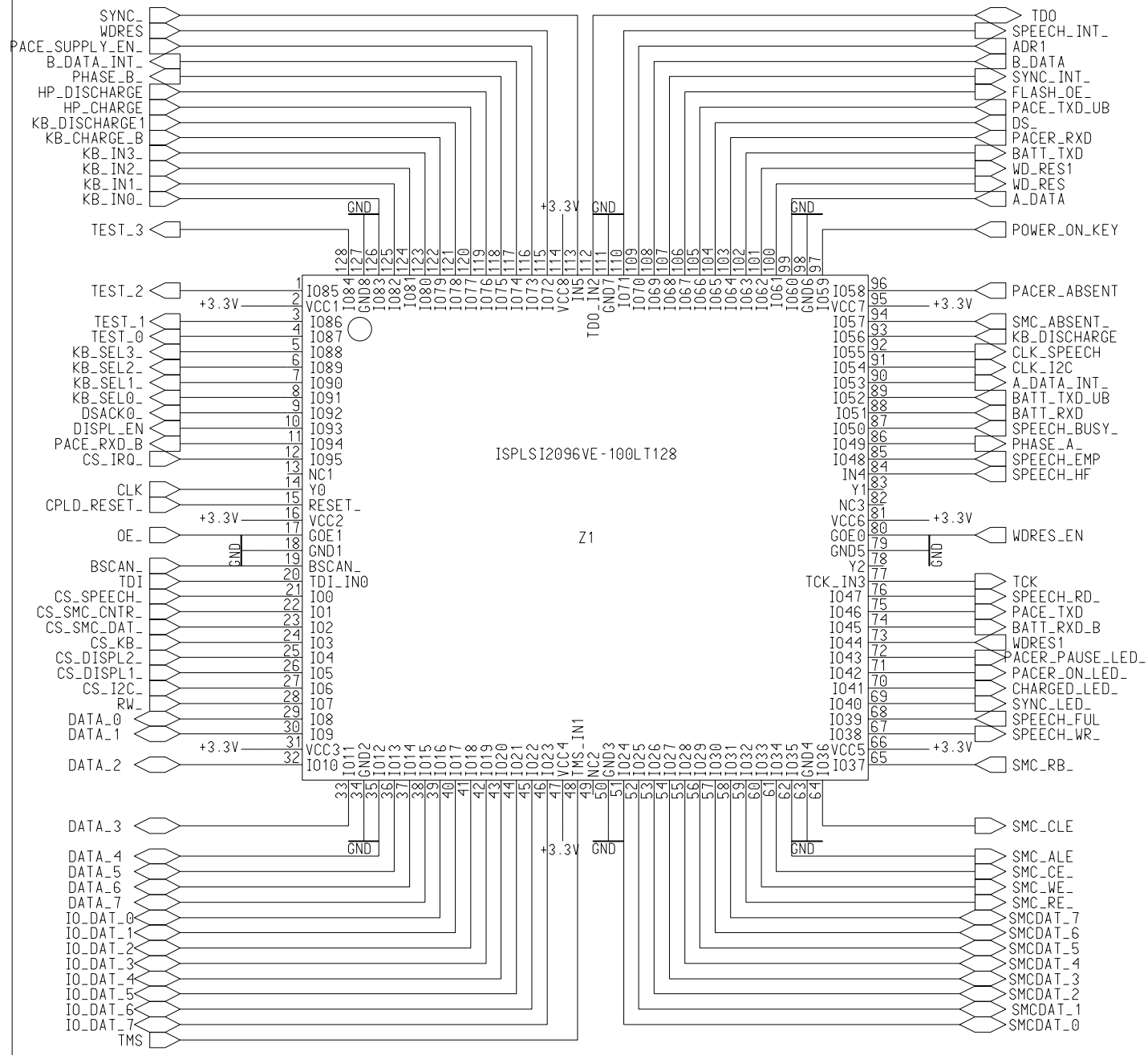

CPLD

Schutzvermerk nach DIN 34 beachten

Marquette Hellige GmbH D-79007 Freiburg					2000924-005	Sheet: 5 of 5
Not equipped in Version :		REVISIONS Revision-No	Index	Date / Name	A04	2000922-001
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x2		MR25286	A	06.07.00/MLM	DRAWN	01.09.99/MLM
x3					APPROVED	03.09.99/CYS
x4						
x5					ISSUED	M. Mueller

SCHEMATIC

DIGITAL DASH-ADD-ON-DEFI

[1999, 6, 30, 4]
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LOET-AS = 154
LOET-BS = 1466

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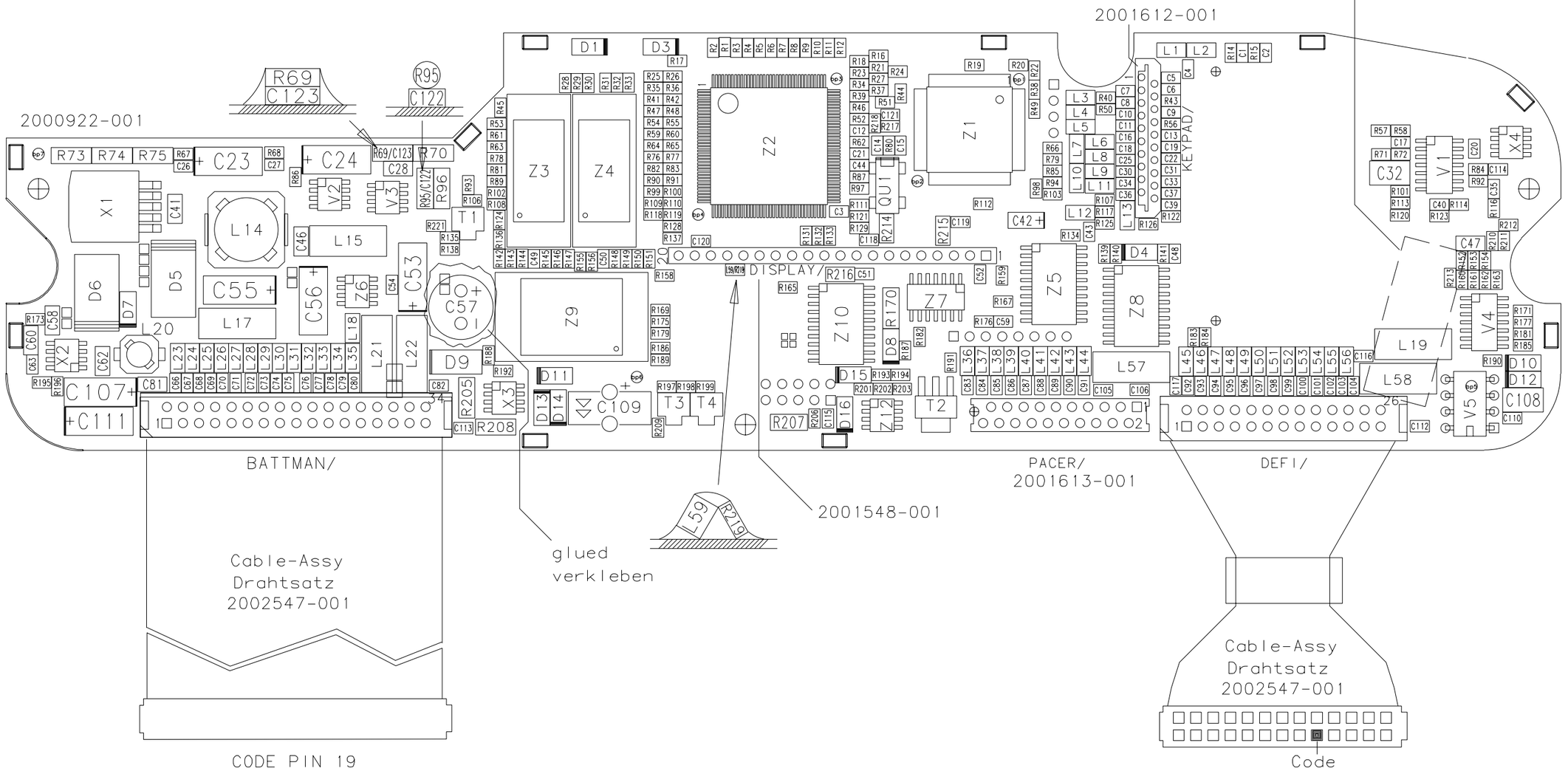
BARCODE auf Rueckseite



Schutzvermerk nach DIN 34 beachten.

GE Medical Systems Information Technologies GmbH	D-79111 Freiburg Munzinger Str.3	2000923-002	1 / 1

REVISIONS				AO3 2000922-001
Revision-No	Index	Date/Name		Date/Name
MR25286	A	14.07.00/MSC		
065698	B	09.11.00/MSC	Drawn	23.12.99/MSC
066217	C	09.01.01/MSC	Approved	23.12.99/MLM
066001	D	10.01.01/MSC		
067933	E	13.09.01/TYR	Issued	M. Gutmann

REF DWG DIGITAL
DASH-ADD-ON-DEFI

to DASH 2000 / 3000
Peripheral Expansion Interface

EXP1/ 1 1 GND — MON/ 1 / MON/ 2 — 80n L11
EXP6/ 3 2 SW+9to18V — MON/13 / MON/14 — 80n L5
EXP1/ 2 3 PER_MARKER_OUT — MON/ 3 — 1u6 L10
EXP6/ 2 4 PER_ENET_PRESENT_ — MON/12 — x1 1u6 L35 not used
EXP1/ 3 5 PER_ENET_TXD-
EXP6/ 1 6 PER_ENET_RXD-
EXP2/ 1 7 PER_ENET_TXD+
EXP5/ 3 8 PER_ENET_RXD+
EXP2/ 2 9 PER_AUTOPORT_ID_RXD
EXP5/ 2 10 PER_PRESENT_ — MON/11 — 1u6 L3
EXP2/ 3 11 PER_ASYNC_RXD — MON/ 4 — 1u6 L6
EXP5/ 1 12 PER_ASYNC_TXD — MON/10 — 1u6 L4
EXP3/ 1 13 TC_PACER_BLANK_ — MON/ 5 — 1u6 L8
EXP4/ 3 14 PER_AUTOPORT_ID_TXD
EXP3/ 2 15 PER_AUTOPORT_RXD
EXP4/ 2 16 PER_AUTOPORT_TXD
EXP3/ 3 17 SW+5V — MON/ 6 / MON/ 7 — 1u6 L7
EXP4/ 1 18 GND — MON/ 8 / MON/ 9 — 80n L9

0U47 C99 — SHIELD — R501 0R x1 — GND GND

D13 BAV99, D10 BAV99 x1, D8 BAV99, D5 BAV99, D9 BAV99, D14 BAV99 — +9to18VM

+5V — R48 10K — SYNC_

T4 BC847B — +5VSW — R34 10K — C1 10N — R32 4K75 — GND

R151 10R — D30 BAS85 — +4V7 — C52 0U047 — D31 BAS85 — +5V

R163 100K

Z4 74HCT125 — PER_ASYNC_RXD — R162 31K6

+5VSW — R160 68R — R24 100K — C3 100P — C5 100P — GND

T21 BC847B — R154 10K — +4V7 — R153 10K — R152 4K75 — GND

Z4 74HCT125 — PER_ASYNC_TXD

R157 1K — R158 31K6 — R23 221R — R25 221R — BC817-25 T2 — R31 10K — PACER_BLANK

R33 4K75 — C8 10N — GND

+4V7 — R156 10K — T22 BC847B — R159 10K — +5V — R161 31K6 — GND — R155 4K75 — GND

+5VSW

+12to17VC — R46 1K — T7 BCP69 — R18 R2 R7 R3 R8 R4 22R — R19 R29 R20 R30 R21 R47 22R — R112 R115 R145 R120 R123 R124 22R — GND

R45 150R — R44 150R — R43 150R — T11 BC817-25 — R41 4K75 — BATT_DISCHARGE — R42 47K5 — GND

PWR_MON(MO_E:0)

PWR_CON(PW_E:0)

CONTROL

PWR_CON(PW_E:0)

LED_CHARGED — +5VB — R141 10K x1 — R142 2K43 — +12to17VA — T19 BC847B — R147 221R — R139 100K — GND

LED_CHARGING — R150 10K x1 — R144 2K43 — T20 BC847B — R148 221R — R149 100K — GND

KB_POWER_ON_

KEY_POWER

POWER_OFF_

BATTMAN_RESET

PIC_RXD

PIC_TXD

USUP — D28 BAV99, D29 BAV99, D27 BAV99 — +12to17VC

1u6 L34 — BATTMAN/ 1
1u6 L33 — BATTMAN/ 2
1u6 L32 — BATTMAN/ 3 / BATTMAN/ 4
80n L31 — BATTMAN/ 5
R106 1K — 1u6 L28 — BATTMAN/ 6 / BATTMAN/ 7
1u6 L30 — BATTMAN/ 8 / BATTMAN/ 9
1u6 L29 — BATTMAN/ 10 / BATTMAN/ 11
R104 1K — 1u6 L24 — BATTMAN/ 12 / BATTMAN/ 13
R105 1K — 1u6 L27 — BATTMAN/ 14 / BATTMAN/ 15
SYNC_ — R75 100R — 1u6 L23 — BATTMAN/ 16 / BATTMAN/ 17
not used — x1 1u6 L25 — BATTMAN/ 18 / BATTMAN/ 19 / BATTMAN/ 20
PACER_BLANK — 1u6 L26 — BATTMAN/ 21 / BATTMAN/ 22
PER_ASYNC_TXD — 1u6 L18 — BATTMAN/ 23 / BATTMAN/ 24
PER_ASYNC_RXD — 1u6 L19 — BATTMAN/ 25 / BATTMAN/ 26
+5V — R74 4K75 — 1u6 L20 — 80n L21 — VCCD — BATTMAN/ 28 / BATTMAN/ 30 / BATTMAN/ 27 / BATTMAN/ 29
80n L15 — 80n L14
VCCP — BATTMAN/ 32 / BATTMAN/ 34 / BATTMAN/ 31 / BATTMAN/ 33
80n L12 — 80n L13

BATT_GN_LED
BATT_YE_LED
KB_POWER_ON_
POWER_ON_KEY
BATT_TXD
BATT_RXD
FREE_BUF_OUT
Code

PCB DIGITAL

KEYPAD
Led Charged 1 — green
Led Charging 2 — yellow
On/Off 19 18

+12to17VC — T10 IRF7416 1-3 5-8 4 — VCCDP — C17 0U47 — C16 0U47 — R56 31K6 — C30 22N — R77 330R — D17 BAS85 — R78 15K0 — DEV_PWR — R79 10K — T13 BC847B — R76 1K — R80 4K75 — GND

NC-BATTERY
12V 2Ah
A/5 BA/1A BA/1B — A/4 BA/2A BA/2B — A/3 BA/3A BA/3B — +12VBAT — R500 Ferrit 0R03 Ferrit — C4 1N — R9 U 40V — GND

T3 IRF7416 5-8 1-3 4 — +12to17VC — D11 BAV99 — R27 31K6 — C9 0U1 — 40V R26 — GND — R37 15K0

0R015 — BQ2014 — A/2 BA/4A BA/4B — A/1 BA/5A BA/5B — BATT_EMPTY — BQ_DQ — L2 1u6 — D7 BAV99 — GND

Z3 74HCT125 Vcc=+5VB,Ground=GNDC — HOLD_5VB — R82 100K — R111 15K0 — R35 10K — R22 100R — R59 100R — BQ_DQ

T5 BC847B — R36 4K75 — C14 47P — GNDC — GND — GND — R81 10K

B/1 BA/10A BA/10B — B/2 BA/9A BA/9B — B/3 BA/8A BA/8B — B/4 BA/7A BA/7B — B/5 BA/6A BA/6B — D3 BAV99 — L1 1u6 — BATT_CONN_ — R113 10K

+5VB — R28 100K — USUP — D15 BAS32 — R84 1K — +5VB — C1 0U1 — 1SMB5.0AT3 D4 — GND

HVGEN_PWR — R17 10K — T1 BC847B — R13 1K — R16 4K75 — GND

T500 IRF4905 — +12VBAT — +12VPWR — C6 0U47 — C7 0U47 — R14 31K6 — ZMM4.7 BZV55C10 D1 D2 — C2 47N — R1 15K0 — BAT1/ 1 BAT2/ 1 — BAT3/ 1 BAT4/ 1 — GND — D6 BAS32 — R6 4K75 — R15 31K6 — R5 330R

PCB ANALOG

R55 2R2 — R146 2R2 — 5x — GNDC GND GNDM GNDS

CONNECT

Marquette Hellige GmbH D-79007 Freiburg						2002441-001	Sheet: 1 of 2
Not equipped in Version :		REVISIONS Revision-No	Index	Date / Name	A03	2002439-001	
x1	2002440-001	ER22558	1	03.04.00/WHL		Date / Name	SCHEMATIC
x2		ER23632	2	04.08.00/WHL	DRAWN	29.03.00 / WHL	
x3		MR25491	A	07.02.01/WHL	APPROVED	30.03.00 / GHH	POWER MANAGEMENT DASH-ADD-ON-DEFI
x4		066505	B	14.03.01/WHL			
x5					ISSUED	W.LOEHNING	

[2000, 3, 2, 5]
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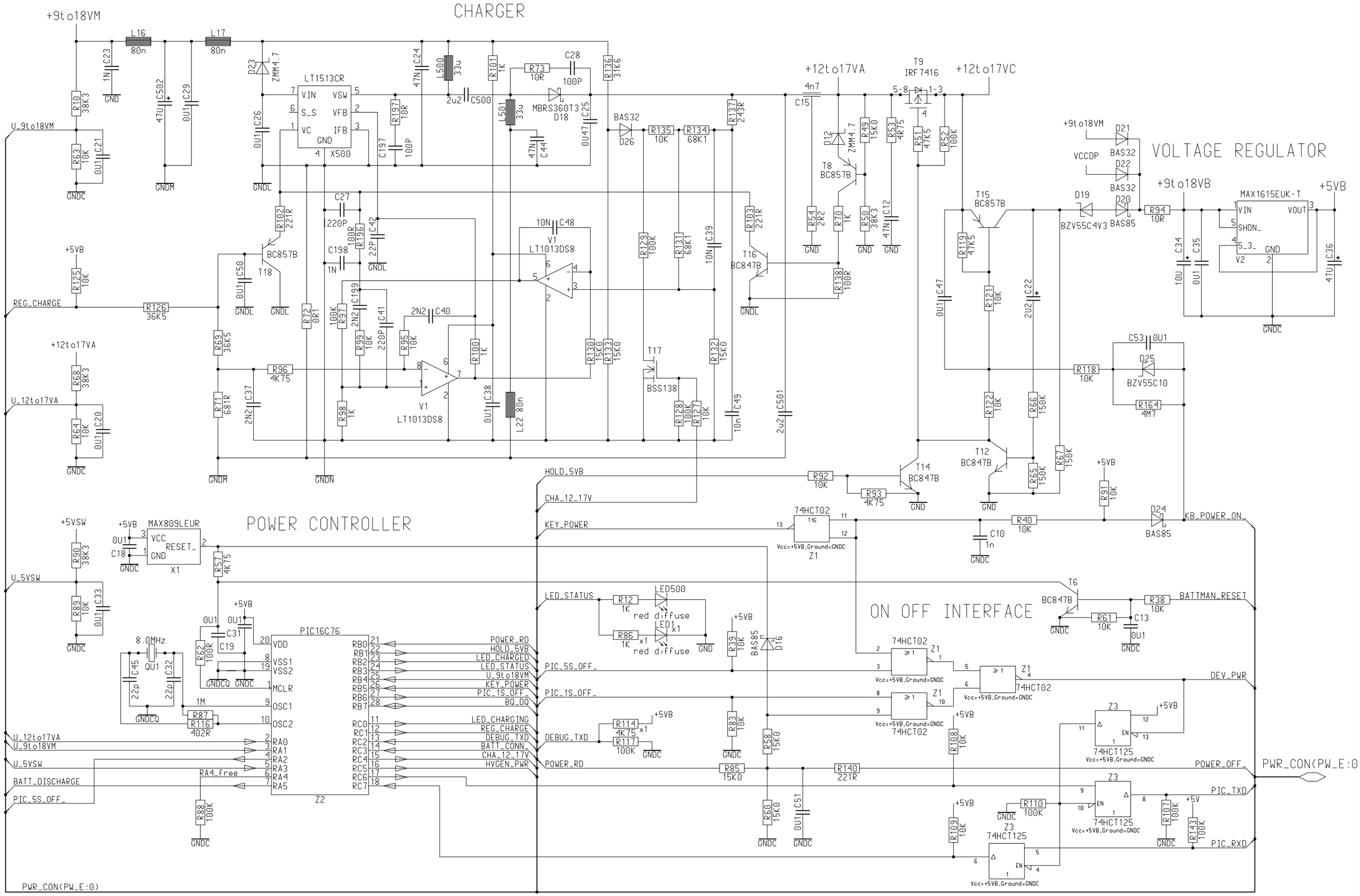

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Marquette Hellige GmbH D-79007 Freiburg						2002441-002 Sheet: 2 of 2
Not equipped in Version :		REVISIONS Revision-No	Index	Date / Name	A03	2002439-001
4x	x1	2002440-001	ER22558	1	03.04.00/WHL	Date / Name
	x2		ER23632	2	04.08.00/WHL	DRAWN 29.03.00 / WHL
	x3		MR25491	A	07.02.01/WHL	APPROVED 30.03.00 / GHH
	x4		066505	B	24.04.01/WHL	SCHEMATIC
	x5					ISSUED W.LOEHNING

POWER MANAGEMENT DASH-ADD-ON-DEFI

[2000, 3, 2, 5]
$USER_CAD_B/2002439/design/control

CABLE ASSY 2003013-001

black
black
red
red

BAT4/
BAT3/
BAT1/
BAT2/

2/2004755-001
R500
T500

10B 10A 6B 6A
BA/
5B 5A 1B 1A

LED500
MON/
91541772

use one of the distance pieces from panel

WAVE
REFLOW

BATTMAN/
Code
44201017

2002439-001
2004813-001

X500
C500
C501
L501
L500
C502

SHIELDING FOIL 2006375-001

Schutzvermerk nach DIN 34 beachten.

Marquette Hellige GmbH D-79007 Freiburg				2002440-002 1 / 2
REVISIONS			A03	
Revision-No	Index	Date/Name	2002439-001	
ER22558	1	03.04.00/MSG	Date/Name	REF DWG
ER23632	2	04.08.00/MSG	Drawn 03.04.00/MSG	
MR25491	A	18.10.00/MSG	Approved 03.04.00/WHL	POWER MANAGEMENT DASH-ADD-ON-DEFI
066505	B	24.04.01/MSG		
			Issued M. GUTMANN	

GLUING

SHIELDING FOIL 2006375-001

1B 5B 6B 10B

BA/ BA/

MON/

BATTMAN/

2/2004093-001

2002439-001

Marquette Hellige GmbH D-79007 Freiburg				2002440-003 2 /2
REVISIONS				A03
Revision-No	Index	Date/Name		2002439-001
ER22558	1	03.04.00/MSG		Date/Name
ER23632	2	04.08.00/MSG	Drawn	03.04.00/MSG
MR25491	A	18.10.00/MSG	Approved	03.04.00/WHL
066505	B	24.04.01/MSG		
			Issued	M. GUTMANN

REF DWG

POWER MANAGEMENT DASH-ADD-ON-DEFI

Schutzvermerk nach DIN 34 beachten.

NO FLOATING

FLOATING

CONTROLLER

CURRENT SENSE AMPLIFIER

PACE_CNTRL(P_MAX:0)

PACE_NO_FLOAT(N_MAX:0)

PACER OUTPUT

PACE IMPULSE DETECTION

PROGRAMMBLE CURRENT SOURCE

STEP DOWN CONVERTER

+5V REGULATOR

PACER_ABSENT

PACE_P/

PACE_M/

+12VP

+HVF

+9VF

+5VF

GNDF

GNDP

GNDHF

GND

PIC16C711-04/SO

4,000MHz

HCNW2611

74ACT14

TL431ACD

MC33063AD

LP2951CM

LMC6482IM

TR500

IRF841

IRLR024

BSS138

BAS32

BYD33M

BAS85

BZD23/C15

BYM13-30

BSP60

1SMB5.0AT3

BYW95C

BYW95C BYW95C

Schutzvermerk nach DIN 34 beachten

Marquette Hellige GmbH D-79007 Freiburg						2001199-001	Sheet: 1 of 1
Not equipped in Version :		REVISIONS Revision-No	Index	Date / Name	A03	2001197-001	
x1	2001198-001	ER23591	2	01.08.00/MLM		Date / Name	SCHEMATIC
x2		MR26482	A	31.10.00/MLM	DRAWN	22.10.99/MLM	
x3		ECO065697	B	30.11.00/MLM	APPROVED	28.10.99/PHG	PACER DASH ADD-ON-DEFI
x4		ECO066704	C	05.04.01/MLM			
x5		ECO066943	D	02.05.01/MLM	ISSUED	M. Mueller	

[1999, 7, 13, 3]
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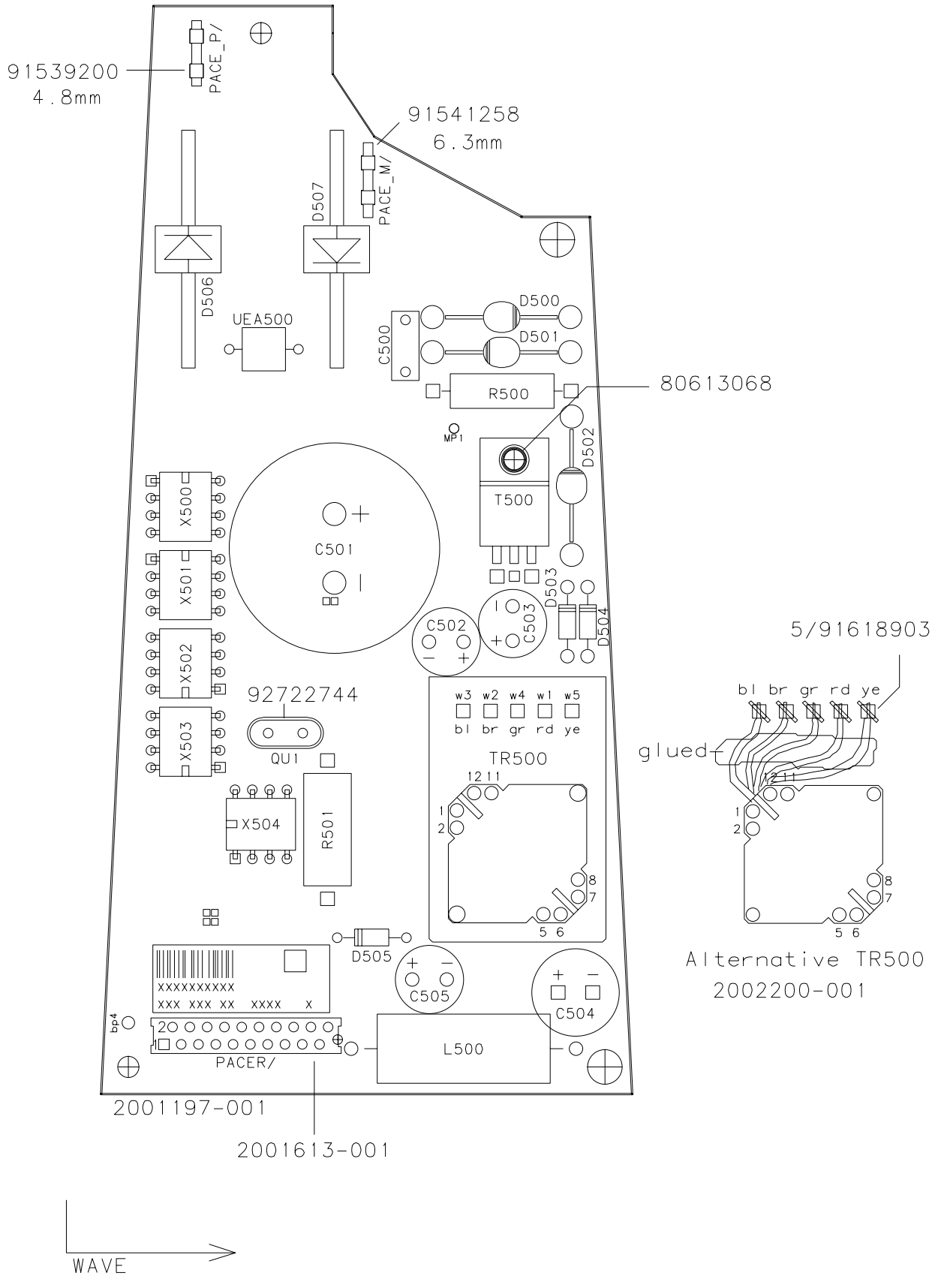

Marquette Hellige GmbH D-79007 Freiburg				2001198-002 1 / 2
REVISIONS				A04
Revision-No	Index	Date/Name		2001197-001
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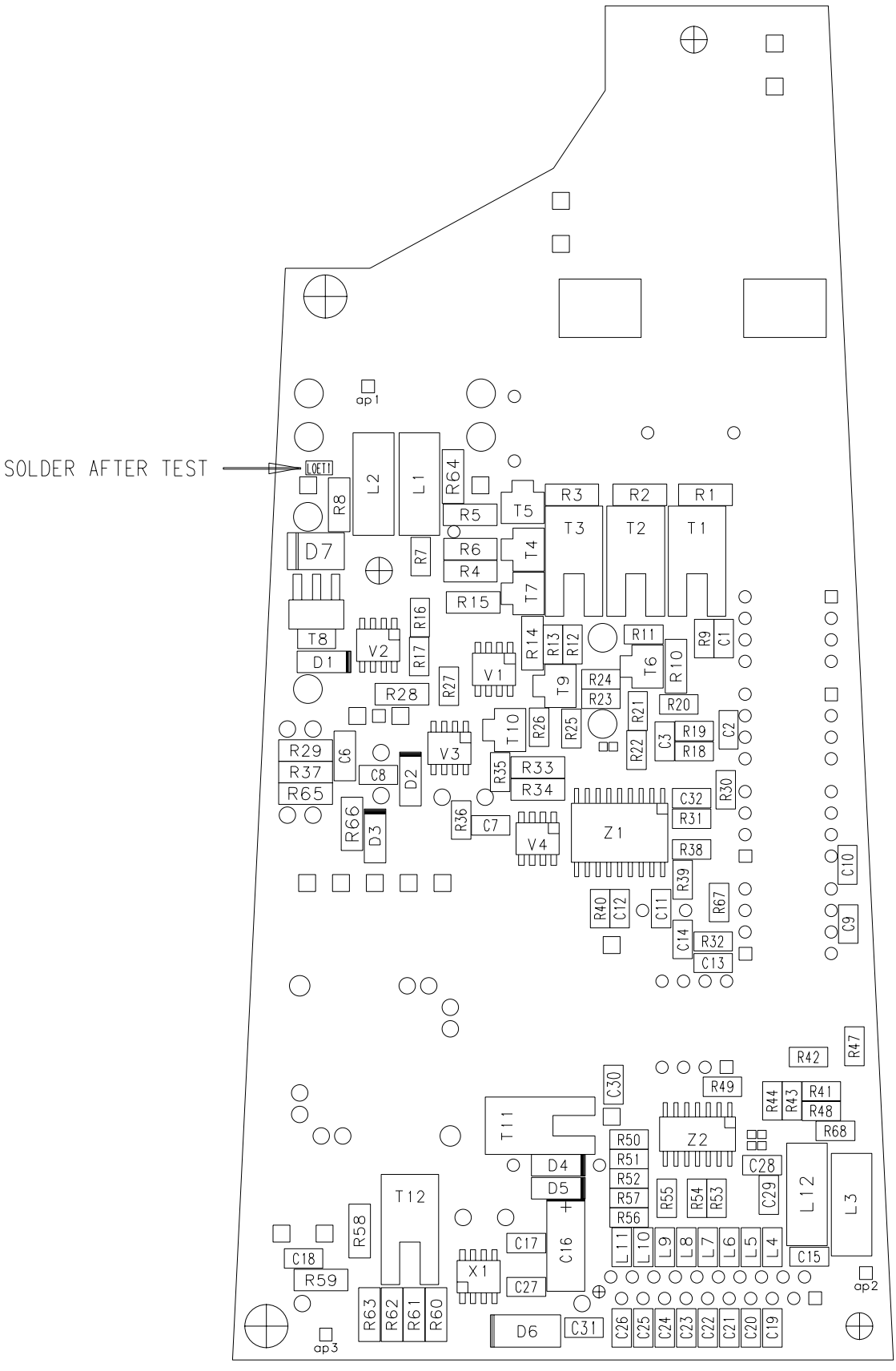
ER23591	2	04.08.00/MSG	Drawn	29.10.99/MSG
MR26482	A	02.11.00/MSG	Approved	02.11.99/MNS
065697	B	06.11.00/MSG		
066943	C	02.05.01/MSG	Issued	M. GUTMANN

REF DWG
PACER DASH ADD-ON-DEFI



2001197-001

GLUING

2×

1×

Marquette Hellige GmbH D-79007 Freiburg				2001198-003 2 / 2
REVISIONS				A04
Revision-No	Index	Date/Name		2001197-001
ER23591	2	04.08.00/MSG		Date/Name
MR26482	A	02.11.00/MSG	Drawn	29.10.99/MSG
065697	B	30.11.00/MSG	Approved	02.11.99/MNS
066704	C	05.04.01/MSG		
066943	D	02.05.01/MSG	Issued	M. GUTMANN

REF DWG

PACER DASH ADD-ON-DEFI

Schutzvermerk nach DIN 34 beachten.

CE
0459

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